

A REVISION OF NORTH AMERICAN CRYPHALINI
(SCOLYTIDAE, COLEOPTERA)

by

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INTRODUCTION

The exceedingly minute bark- and twig-boring beetles of the tribe Cryphalini have received very little attention. Numerous species have been briefly described, but in the absence of revisional works and other taxonomic aids, identification has been virtually impossible. In order to partially alleviate that condition, the object of this work has been to redescribe and provide keys for the representatives of this group from North America north of Mexico, and to contribute toward our knowledge of their biology and phylogeny. While only the native species are treated in full, all of Hopkins' types, and representatives of practically all other known Neotropical species were examined in order to establish or avoid synonymy. During this investigation approximately 8,000 specimens of Cryphalini were examined; of these the author either collected or assisted in the collection of more than 5,000 from the western, central, and southern United States.

The group of genera allied to Cryphalus Erichson was recognized as distinct from other subdivisions of the Scolytidae as indicated by the usage of the names Cryphaloideae of Lindemann (1875), Cryphalidae of Eichhoff (1879), Cryphali of Blandford (1904), Cryphalinae of Tredl (1907), Hagedorn (1910a, 1910b), and Hopkins (1915a), and Cryphalina of Balachowsky (1949). Although the taxonomic rank employed by these authors varied from that of subfamily

to tribe or subgroup, the genera included were essentially the same with the notable exception of Hopkins. His subfamily Cryphalinae included not only the group in question, but representatives of at least two or three quite unrelated tribes as well.

The tribe Cryphalini as treated here is a modification of Balachowsky's concept, and includes the following North American genera: Procryphalus Hopkins, Ernopocerus Balachowsky, Cryphalus Erichson (= Trypophloeus Fairmaire, and Glyptoderus Eichhoff), Gryphalomorphus Schaufuss (= Lepicerus Eichhoff, Letznerella Reitter, Ernoporides Hopkins, and Lepicerinus Hinton), Taenioglyptes Bedel (= Cryphalus of most authors), Hypocryphalus Hopkins (= Dacryphalus Hopkins), Cryptocarenum Eggers (= Tachyderes Blackman), Stephanoderes Eichhoff, Hypothenemus Westwood (= Homoeocryphalus Lindemann, and Adiaeretus Hagedorn), and Trischidias Hopkins.

The only original attempt to classify the North American Cryphalini worthy of note was made by Hopkins (1915b) who added 64 new species to the ten previously recorded in these genera from America north of Mexico. Many of his species were based not on existing morphological structures or even on individual variations, but on host plant records or imaginary characters. For example, the original descriptions of Stephanoderes brunneus and S. frontalis, each consisting of 21 words, clearly point out

conspicuous differences in body color and spacing of the marginal teeth on the pronotum; however, the types are identical with respect to both features. Blackman (1922), attempting to follow Hopkins' classification of Stephanoderes and Hypothenemus, redescribed many of the species from Mississippi, but recognizing the existence of considerable confusion did not assign names to a third of those listed.

The Cryphalini are cosmopolitan in distribution, although the great majority of genera and species occur in the tropics. Procryphalus is confined to the coniferous forests of Canada and the high mountains of the western United States; Gryphalus has a similar North American distribution, but also occupies the same habitat in Eurasia. Cryphalomorphus, Hypocryphalus, and Cryptocarenum are tropical genera and reach only to the subtropical southern tip of Florida and possibly of Texas. Ernopocerus, although known only from a single specimen in North America, is confined to the temperate deciduous forests; Trischidias, known only from North America, evidently is also limited to this habitat. Stephanoderes and Hypothenemus are tropical in distribution except in North America where they range over most of the deciduous forest areas. Taenioglyptes in the western hemisphere is known only from the northern coniferous forests; however, in the eastern hemisphere it occurs from the northern coniferous forests of Eurasia to tropical Australia.

BIOLOGY

Contrary to popular belief host selection in the Cryphalini is not highly developed, except in the genus Procryphalus and in the following species of other genera: Cryphalus thatcheri, Hypocryphalus mangiferae, Taenioglyptes rubentis, Stephanoderes liquidambara, and Hypothenemus pubescens. Possibly there are two or three additional species known from insufficient material to be recognized as monophagous. The North American species of Cryphalus and Taenioglyptes, while not host specific, are restricted to one genus or to a few closely related genera of trees. They may therefore be considered oligophagous. The species of Cryptocarenum, Stephanoderes, Hypothenemus, and Trischidias exhibit a variable degree of host specificity ranging from one or two host species to pronounced polyphagy. Some species of Stephanoderes and Hypothenemus utilize coniferous and monocotyledonous as well as dicotyledonous host plants. In Table 1, the number of host species and the number of times each species of beetle was collected from a known host is recorded together with an estimate of the probable degree of host selection. Those species confined to one or two plant genera are considered oligophagous; those collected from four or more host genera are considered polyphagous.

TABLE 1

A summary of host selection in North American Cryphalini including: the number of collections having host records, the number of hosts recorded, and an estimate of the degree of host specificity.

Species Name	Number of Collections	Number of Hosts	Mono-phagous	Oligo-phagous	Poly-phagous	Doubtful
<u>Procryphalus utahensis</u>	10	1	*			
<u>P. mucronatus</u>	17	1	*			
<u>Cryphalus nitidus</u>	9	5		*		
<u>C. salicis</u>	4	2 (?)		*		
<u>C. populi</u>	9	4		*		
<u>C. thatcheri</u>	5	1	*			
<u>Cryphalomorphus floridensis</u>	4	2		*		
<u>Hypocryphalus mangiferae</u>	6	1	*			
<u>Taenioglyptes pubescens</u>	13	4			*	
<u>T. rubentis</u>	5	1	*			
<u>T. r. ruficollis</u>	22	7		*		
<u>T. r. anabilis</u>	4	2		*		
<u>T. r. coloradensis</u>	3	3		*		

TABLE 1 (Continued)

Species Name	Number of Collections	Number of Hosts	Mono-phagous	Oligo-phagous	Poly-phagous	Doubtful
<u>T. fraseri</u>	17	2		*		
<u>Cryptocarenum floridensis</u>	28	15			*	
<u>Stephanoderes hirsutus</u>	16	9			*	
<u>S. dissimilis</u>	27	13			*	
<u>S. rotundicollis</u>	14	8			*	
<u>S. erectus</u>	4	4			*	
<u>S. castaneus</u>	35	23			*	
<u>S. obesus</u>	17	10			*	
<u>S. brunneus</u>	37	29			*	
<u>S. interstitialis</u>	53	20			*	
<u>S. nitidipennis</u>	23	16			*	
<u>S. squamosus</u>	11	8			*	
<u>S. sparsus</u>	2	2				*
<u>S. obscurus</u>	71	59			*	

TABLE 1 (Continued)

Species Name	Number of Collections	Number of Hosts	Mono-phagous	Oligo-phagous	Poly-phagous	Doubtful
<u>S. andersoni</u>	5	5			*	
<u>S. liquidambarae</u>	3	1	*			
<u>S. spargiae</u>	49	26			*	
<u>Hypothenemus beameri</u>	14	13			*	
<u>H. c. californicus</u>	2	2				*
<u>H. c. tritici</u>	37	24			*	
<u>H. eruditus</u>	109	61			*	
<u>H. pubescens</u>	4	1	*			
<u>H. columbi</u>	13	7			*	
<u>Trischidias atomus</u>	14	12			*	

Conclusive proof of polyphagy was found at the Subtropical Experiment Station in Homestead, Florida, where easily recognizable species such as Cryptocarenum floridensis, Stephanoderes castaneus, and Hypothenemus beameri were collected in an area less than 100 yards in radius from numerous (8, 12, and 17 host species respectively) introduced ornamental plants as well as from native species. The evidence of polyphagy presented in Table 1, and the absence of biological and morphological differences led to the conclusion that both Stephanoderes obscurus and Hypothenemus eruditus, collected from 21 and 22 species of introduced ornamental plants (at the Subtropical Experiment Station) respectively, are easily recognizable, widely distributed species, and are not composed of numerous, closely related, virtually indistinguishable, physiologically distinct forms as the writings of Hopkins (1915a, p. 209; etc.) suggest.

New galleries of the Cryphalini are generally started in weakened or dying parts of the host plant, usually in twigs or branches of trees, shrubs, vines, and some herbaceous plants, more rarely in dead bark or in the boles of larger trees. The portion of the host utilized and the type of galleries constructed by the beetles are generally characteristic of the genus and have some phylogenetic significance. Within each genus, however, tunnels of the various species are irregular, making specific determination impossible from

the work alone.

The species of Procryphalus and Cryphalus usually tunnel in the outer bark of limbs or in boles larger than two inches in diameter; they seldom reach the cambium region. The galleries are of the simple cave type, about two to six millimeter wide and several times longer than wide; they are often U- or Y-shaped, or irregular as illustrated by Hagedorn (1904, p. 373). Their walls are stained black, presumably as a result of the growth of a symbiotic fungus which may assist the beetles in overcoming the living tissues of the host in which they live. The beetles are monogamous and both sexes are found in the galleries where repeated mating probably occurs since it is known in other scolytids, and since many mating pairs are found when the galleries in various stages of construction are opened. The eggs are deposited in clusters in the parental galleries. After hatching the larvae mine into the surrounding bark, often moving only four or five millimeters from their starting point; their course is very irregular.

The species of Taenioglyptes generally attack the boles of young, weakened, standing trees about four to eight inches in diameter, although it is not uncommon to find them in broken limbs and branches or in seedlings. The beetles are monogamous. Although both sexes may be present mating was not observed in the egg chamber, but was observed on the

surface of the bark of the brood tree immediately following emergence. The egg chamber lightly engraves the cambium, and is of the simple cave type, frequently oval in shape although elongate egg tunnels may occasionally be present. The eggs are deposited in clusters around the periphery; the larval tunnels then radiate from the egg chamber, usually forming an irregular pattern, although the larval tunnels of T. fraseri observed at the Great Smokies National Park in Abies fraseri curved until they became parallel with the grain of the wood. It is not impossible that this was an adaptation to the extremely thin bark of this particular tree, and not characteristic of the species.

The galleries of Hypocryphalus mangiferae appear to be of the same general type as those of Taenioglyptes; however, the tunnels observed had been largely obliterated because of the heavy infestation. The beetles are monogamous, a pair occurring in nearly every parental egg chamber.

The tunnels of Stephanoderes and Hypothenemus generally are constructed in dying twigs or branches less than one inch in diameter, rarely in larger parts of the host. Each system of galleries includes a small central chamber located in the cambium region, but often extending to the pith. From this central chamber one or more brood galleries extends more or less parallel with the grain of the wood; part of those in any one gallery system may be

located in the cambium region, part entirely in the wood, and part in the pith (Blackman, 1922, Fig. 71). In some Hypothenemus particularly, the central chamber is often reduced in size, and when the infestation of beetles is heavy it is not uncommon for the brood galleries of several systems of galleries to be connected. Where these compound galleries occur, species or even generic boundaries are not recognized and several species, often representing different genera, may be found in the same portion of one tunnel. In one instance specimens of Cryptocarenum floridensis, Stephanoderes castaneus, S. brunneus, and Hypothenemus beameri were all removed from the same tunnel. The eggs of Stephanoderes and Hypothenemus are deposited individually or in small clusters in the brood galleries. Upon hatching, the larvae, at least in Stephanoderes, remain in the gallery and feed both by eating boring dust produced by the adult beetles and by enlarging their gallery. When mature they may form a series of individual pupal cells in part of one tunnel, separated from one another by plugs of frass. This habit is not consistently followed; additional observations are desirable. In some Hypothenemus the larvae may leave the brood chambers and make irregular tunnels in the inner bark; there evidently is considerable variation of this habit in larvae from a single gallery. In both genera the males are conspicuously smaller than the females and extremely rare. The males

evidently live only a few days after transformation and seldom become fully sclerotized. They have not been observed to travel more than a few inches from their home gallery and evidently cannot fly. The female, when mature, flies to a suitable host where she begins a new gallery; she rarely is joined by a second female but never by a male.

The biology of Cryptocarenum is very similar to Stephanoderes except that the brood gallery is a rather large, extremely long tunnel constructed in the pith of small branches and stems. Trischidias atoma is more similar in habits to the Hypothenemus species; T. minutissima larvae and adults were obtained from minute cavities under fungus (?) pustules on the outer layer of bark of a Red Mangrove root. The species of both Cryptocarenum and Trischidias are sexually dimorphic; the males are of reduced size and rare.

The large number of specimens of Cryphalomorphus floridensis present and the fibrous structure of the hosts made observation extremely difficult; however, it appeared that both sexes participated in the construction of the new burrows which were located in the region of the pith.

In the southern states the species of Cryphalini evidently are active throughout the year; however, toward the north only the adult females of Stephanoderes, Hypothenemus, and Trischidias, and the larval and pupal stages of Procryphalus, Cryphalus, and Taenioglyptes survive the winter.

Among emerging Taenioglyptes, mating was observed on the outer surface of the brood tree, and since both sexes are present later in the egg chamber, repeated mating probably occurs there also; it was observed only in the egg chamber in Procryphalus and Cryphalus. In contrast, mating was never observed in Stephanoderes, Hypothenemus, Trischidias, and Cryptocarenum in spite of hundreds of series collected. Because the males in these genera are extremely rare (an average of more than 40 females per male), short lived, and fragile, it is doubtful if they are capable of mating with more than a very small percentage of the available females, and since only females in the northern states survive the winter, yet virtually all those surviving produce young (mated female scolytids are not known to overwinter and produce young without an additional mating in the spring), it is highly probable that the species in these genera are at least partially parthenogenetic.

INTRASPECIFIC VARIATION

In a group such as this, where relatively minute differences distinguish genera, every morphological detail must be utilized to separate species. Unfortunately one or two of these minute differences with taxonomic value occasionally vary between individuals or clones (?) of a particular population and are often misleading. For this reason combinations of several characters are utilized in the systematic section to distinguish species, making

accurate determinations possible even though one or two structures may be absent from the specimens at hand.

Sexual Variation

The most consistent and often the only external morphological means of separating males and females is by the relative size and shape of the seventh and eighth abdominal terga. In the male both terga are visible, sclerotized, and pubescent (Fig. 41). In the female only the seventh tergum is sclerotized and pubescent (Fig. 42); it is larger than in the male and completely conceals the small membranous eighth tergum.

Within the tribe there is a progressive tendency toward sexual dimorphism (Figs. 1-4). The males and females of Hypocryphalus and Taenioglyptes are usually about equal in size and abundance. In Procryphalus, Cryphalus, and Cryphalomorphus about one-third of the males are slightly smaller than the females, but males and females are equal in abundance. The males of Cryptocarenum, Stephanoderes, Hypothenemus, and Trischidias are conspicuously reduced in size and extremely rare; the eyes are reduced in size; the antennal funicle has one less (?) segment than is the case with females; the club is more slender; some of the teeth may be absent from the anterior margin of the pronotum; the elytral striae are obscure; the frontal, pronotal, and elytral punctures are obscure or absent; and the pubescence

is longer on the sides and declivity than in the females. These modifications reach their climax in Trischidias where only one male could be found while collecting more than 200 females. Determination of the dimorphic males is unusually difficult, since variation between individuals is often so extreme that keys and descriptions are meaningless.

In the genus Taenioglyptes the short, abundant elytral scales tend to be slightly larger in males than in females; this is particularly noticeable in T. ruficollis. In Hypocryphalus mangiferae, and to a lesser extent in other genera, the posterior margin of the fifth abdominal segment of the male is more broadly rounded than that of the female.

Individual Variation

Intraspecific variation in body length generally is inconspicuous, but may occasionally be rather striking. The greatest such variation occurred in Stephanoderes dissimilis where the difference in length between the smallest and largest specimens equalled 50 per cent of the body length of the smallest; it is of interest that the smallest specimen is known to be the offspring of the largest. Fluctuations of this magnitude occurring within a single population are evidently due to environmental factors; for example, rapid drying of the host tissues during the larval stage usually results in smaller body

size of the beetles affected.

Body color, as in other scolytids, has been observed to change with the age of living specimens from pale yellow to light brown to the mature color of dark brown or black. Frequently the asperate area of the pronotum darkens first, but its color may remain reddish until long after the mature color of other parts has been attained. Intraspecific differences in pubescence ordinarily result from damage caused to setae by rubbing, although variations in the length and width of elytral bristles are common.

The specimens of an entire series of a Stephanoderes and Hypothenemus species, particularly those obtained from a single system of galleries, often appear morphologically identical, and usually differ slightly from other such series. Additional series obtained from one gallery system in the same locality include specimens no two of which are alike, and may contain specimens identical with, or intermediate between, all possible combinations of characters found in the morphologically homogeneous series. While other characters such as the teeth on the anterior margin of the pronotum and the ratio of body length to width vary independently of other characters, the variation in elytral bristles of Hypothenemus eruditus is used to illustrate this observation. Four appropriate series collected at Homestead,

Florida, July 10, 1951, were selected and each specimen examined to determine the relative width of one average bristle on the upper half of the second declivital interstriae. Results (Fig. 121) show 95 per cent of the series collected from Sambucus canadensis have the elytral bristles two and one-fourth or more times as long as wide (about as in Fig. 114), while 93 per cent of the Tectona grandis series have bristles less than two times as long as wide (about as in Fig. 113). Based on these series, two morphological species might be recognized; however, the series collected from Bauhinia grandiceps and Hibiscus rosa-sinensis are intermediate between these extremes and contain representatives approaching both extremes. The similarity of specimens within certain series is presumably due to the similarity of their genotypes, and may be explained by several generations of inbreeding (which is likely since the progeny mate, if at all, before leaving the parental galleries) or by parthenogenesis, or a combination of the two. Variable series may result either from outbreeding or from the presence of more than one egg-laying female in a single system of galleries. The analysis of series from other localities, either from the same or different host plants, yields results similar to those obtained in the above example; however, they are somewhat less conclusive because fewer specimens are available.

The frons of the species of Cryphalus may vary in a single series from weakly concave to slightly convex, and it may or may not have a median impression. In Stephanoderes and particularly in Hypothenemus a narrow median longitudinal groove, often present at the summit of a broad median longitudinal elevation, may vary within a population from rather broad and shallow to very narrow and deep, or occasionally may be entirely absent.

The number of segments in the antennal funicle is constant in the females, except that in Stephanoderes castaneus there are only three (rarely four) segments, instead of five. However, in many specimens of this species incompletely fused segments clearly indicate the fourth and fifth segments which are in the process of being lost (Fig. 21). The funicle of males of Cryptocarenum, Stephanoderes, and Hypothenemus normally consists of one less segment than that of the female, but the distal segment is often partially divided.

The number of denticulations on the anterior margin of the pronotum is often extremely variable, but in some genera is sufficiently constant to have taxonomic value. In Taenioglyptes these teeth are taxonomically useless; they vary from three to eight within a single population (Figs. 50-52), and instead of being symmetrically arranged, they all may occur on one side. In other genera, while one or two teeth may be absent or supernumerary, one side or the

other will usually be normal and have taxonomic significance. Additions to, or subtractions from, the normal number results in crowding or large gaps that ordinarily are quite obvious. As mentioned previously, the males of the sexually dimorphic species may lack one or even all of the marginal teeth; it is rather unusual to find one with the normal number.

Differences in the spacing of punctures of the pronotum, striae, and interstriae, and in the number of tibial teeth often occur between the right and left sides of a single specimen. These variations although interesting, usually are rare and not of sufficient magnitude to warrant discussion.

Geographical Variation

The unusual amount of individual variation within some populations complicated by the lack of it in other populations of sexually dimorphic species, and the absence of biological data and of specimens from critical localities have made the detection of geographical variation difficult. From the specimens available only two species, Taenioglyptes ruficollis and Hypothenemus californicus, exhibit consistent variations which warrant the recognition of subspecies. The frontal characters of Stephanoderes obscurus vary slightly in a north-south cline which changes with, but evidently is not due to climatic differences (see p. 171). The teeth on the anterior margin of the pronotum in

Stephanoderes brunneus show geographical differences. A discussion of this variation is included in the systematic section following the description of these species.

No ecological rules have been detected which could be applied to the Cryphalini. The distribution of most genera is restricted to a single climatic zone, and since host selection and morphological characters generally are not rigidly fixed the effects of climate and host are not readily apparent.

COMPARATIVE MORPHOLOGY

A classification of the higher categories in the family Scolytidae based on a consideration of all, or even a major part of the significant morphological characters is not available. It is therefore difficult to establish the relationship of the Cryphalini to other groups in the family, particularly when only about half of the known genera are available for study.

The tribe Cryphalini is included in the subfamily Ipinae (family Ipidae of Hopkins, 1915a; supertribe Ipini of Balachowsky, 1949), because the outer apical angles of the tibiae are not produced beyond the tarsal insertion, the anterior margin of the elytra are not armed, the head is never prolonged to form a short beak, and the pronotum usually conceals the head from above and is armed with asperities on the anterior slope. Within the Ipinae the tribe Cryphalini may be characterized as follows.

Antennal club flattened, with sutures indicated on both sides, but anterior and posterior faces dissimilar, sutures on posterior face more strongly procurved and extending nearer distal end than on anterior face; funicle three to five segmented; anterior slope of pronotum declivous and armed with rather large, isolated asperities, the anterior margin usually bearing one to nine denticulations; basal and usually lateral margins of pronotum with a fine, raised line; costal margins of elytra ascending posteriorly; metepisternum partly covered, by elytra, but visible its entire length; anterior coxae contiguous; tibiae increasing in width distally, and armed with three or more teeth on outer and distal margins, those on the posterior tibiae confined to the distal one-third.

Based on the examination of representatives of virtually all of the genera of Holarctic and Neotropical Ipinae, the tribes most closely allied to the Cryphalini appear to be Micracini and Pityophthorini. These groups share the asperate anterior slope of the pronotum, the strongly flattened antennal club which is sutured on both sides and never obliquely truncate, and at least in some genera denticulations arm the anterior margin of the pronotum. At best these tribes are only remotely related and it is not impossible that the similarities mentioned have no phylogenetic significance.

Color

The body color of species of Cryphalini is usually uniform. The species of Procryphalus, Cryphalus, Ernopocerus, Cryphalomorphus, Stephanoderes, Hypothenemus, and Trischidias are brownish-black or black, except Stephanoderes castaneus which is a rather dark reddish-brown when mature; those of Cryptocarenum are a rather light reddish-brown; and those of Taenioglyptes and Hypocryphalus are rather dark yellowish-brown. The setae ordinarily are white in color with a slight yellow tint; in Stephanoderes castaneus they have a reddish tint, and in Trischidias georgiae and T. minutissima they are dusky, at least on the declivity.

Size

The body length varies within the tribe from 0.5 to 2.5 mm. The limits of variation within a species are fairly well established, so that size alone is often useful in classification. The species of Trischidias and most Hypothenemus are readily recognized by their small size, and if only this feature is used they can be confused only with the males of a few of the smaller Stephanoderes species.

Frons

The frons is very broad and distinctly convex in most species, often with a narrow, rather short median groove, or a broad median elevation. A few species have the

lower half of the frons slightly concave with a transverse row of tubercles (Cryptocarenum) or a transverse carina (Stephanoderes obesus, S. brunneus, and Hypothenemus columbi) at its upper level. While presence or absence of the median groove and the contour of the frons are quite variable within many species, a combination of these characters serve as the only reliable means of separating Stephanoderes obscurus and S. georgiae. The surface is usually rather coarsely reticulate with a few fine punctures; these punctures are useful in separating Procryphalus mucronatus and Stephanoderes andersoni from allied species. The frontal pubescence is usually short and sparse.

Eye

The eye varies from rather long and slender in Procryphalus species to short and oval in the species of Trischidias. In some of the genera it is entire, or at most slightly sinuate along the anterior margin; however, in Cryphalus and Hypothenemus a few facets may be absent suggesting an emargination; in Taenioglyptes, Hypocryphalus, Cryptocarenum, and Stephanoderes it is clearly, though shallowly, emarginate.

In Cryptocarenum floridensis the eyes are greatly enlarged, with a corresponding increase in size of the facets. While this is not found in C. porosus, it has been observed in other tropical representatives of the genus.

Antenna

The antennal funicle consists of from three to five segments in the female, the number usually being characteristic of the genus (except Stephanoderes castaneus). In the males of Cryptocarenum, Stephanoderes, Hypothenemus, and Trischidias the number of segments is ordinarily one less than that of the female. In addition to their number, the relative width of the funicular segments may be significant, for example, the second and most distal segments are of equal width in Procryphalus, Ernopocerus, Gryphalomorphus, Hypothenemus, and Trischidias, while in Gryphalus, Taenioglyptes, Hypocryphalus, and Cryptocarenum the distal segment is much wider than the second. In Stephanoderes there is complete intergradation between a very broad and a narrow fifth segment.

In outline the antennal club varies from circular to quite slender, and usually has one or two rather distinct constrictions at the sutures except in Ernopocerus, Gryphalomorphus, and Hypocryphalus. The sutures are indicated by rows of setae on both faces, the first suture may be completely septate, partly septate, or aseptate, but is constant within a genus. In the Gryphalini the anterior and posterior faces are dissimilar, the sutures on the posterior face are more strongly procurved and extend a greater distance toward the distal end of the club than those on the anterior face. On the anterior face the sutures

may be recurved, straight, or strongly procurved.

Pronotum

Although quite variable within some species, the number of denticulations arming the anterior margin of the pronotum is of considerable taxonomic importance. Their number may vary from one in Hypothenemus miles to as many as ten in Cryptocarenum floridensis. These teeth normally are arranged in symmetrical pairs, the first or median pair is usually the largest, the second pair which is lateral to the first is somewhat smaller, the third pair is smaller than the second, etc. An abnormality in their arrangement, either the addition or loss of a tooth, results in crowding or wide spacing on one side and is ordinarily quite obvious when compared with the normal side.

The anterior slope of the pronotum is strongly declivous and bears several large, rather isolated asperities. The number and arrangement of the asperities is quite constant in the larger species of Stephanoderes and therefore is useful in their determination. The subconcentric arrangement of the asperities mentioned by Hopkins (1915a, p. 40) and Chamberlin (1939, p. 311) applies only to those asperities near the summit in certain specimens of Taenioglyptes. The subconcentric arrangement is obscure at best and may occur in an occasional specimen of almost any series of beetles belonging to this genus. The surface of the pronotum posterior to the asperate region

is usually rather sparsely punctured, frequently some or all of the punctures are granulate. A seta usually arises from each puncture or granule; they may be either scale-like or hair-like.

The presence or absence of a fine, raised, basal and lateral line on the pronotum is used as one of the more important indicators of the direction of evolution within the tribe, and is the basis for a major division of genera. Only an obscure indication of a raised basal line is found in Procryphalus and Ernopocerus; the lateral line is absent in these genera. The species of Cryphalus and Cryphalomorphus have a distinct basal line, but the lateral line is absent in Cryphalus, and although present in Cryphalomorphus, it is not clearly defined by an acute lateral margin. Species in the remaining genera have both the lateral and basal lines distinct; the lateral line is present on only the basal one-third, except in Cryptocarenum in which it extends for two-thirds of the lateral length of the pronotum.

Scutellum

While the visible portion of the rather large, flat scutellum is somewhat variable, both within and between species, this variation is not sufficient to be included in descriptions. Its use would increase rather than decrease the confusion of species.

Elytra

While the distinctly ascending posterior costal margins of the elytra are used as a tribal characteristic, there is some variation in this feature within the group. In Procryphalus, for example, the posterior ascension of the costal margin is only slight; in Ernopocerus and Cryphalomorphus it is more distinct, but not as prominent as in the other genera. Since the elytral striae and the strial punctures are quite variable within the tribe, they are most useful in the identification of some genera. The striae generally are quite narrow, as compared to the interstriae, and usually impressed; the strial punctures vary from minute, shallow, and obscure to very large and deeply impressed; each puncture bears a minute, inconspicuous, hair-like seta. The interstriae are either flat or weakly convex; their surface is punctured; the punctures vary from abundant and confused to a single, evenly spaced, uniserial row along each interspace. While the interstitial punctures usually are rather fine and shallow, they may be quite coarse, but more frequently are distinctly granulate. Each interstitial puncture gives rise to a seta which may be either hair-like or scale-like; on each interstria a uniserial row of widely spaced, bristle-like setae is much longer than the others. These larger bristles vary in length and width independent of the shorter, more abundant setae, and thereby afford exceedingly useful taxonomic

characters. In those Stephanoderes species where only a single row of interstitial punctures persists, only the longer interstitial bristles remain, and between these bristles is a single row of the minute strial setae.

The elytral declivity is uniformly convex and rather steep in most species of Cryphalini, with the striae and interstriae essentially as on the disc. In Cryphalus species the declivity is slightly impressed between the first and fourth interstriae, and the lateral elevations may be armed with minute granules or small, slender teeth. In Stephanoderes hirsutus and S. squamosa the declivity is more or less flat; in addition S. squamosa has a low, subcarinate elevation at the posterior lateral declivital margin.

Legs

The tibiae are of limited use in distinguishing species, but are of considerable taxonomic importance at the generic level. The tibiae of all three pairs of legs are rather broad in Procryphalus, Ernopocerus, Cryphalus, Cryphalomorphus, and Taenioglyptes, and bear several teeth. In Hypocryphalus, Cryptocarenus, Stephanoderes, Hypothenemus, and Trischidias the tibiae are more slender and bear fewer teeth; the teeth on the hind tibiae in these genera are almost entirely limited to the distal margins.

The third tarsal segments are cylindrical except in Taenioglyptes species in which they are broad and

emarginate, in Gryphalus they appear laterally compressed.

PHYLOGENY

In selecting characters which indicate the probable direction of evolution in the Gryphalini many progressive modifications were observed to be consistent with those applying to the entire family, others to indicate specializations peculiar to the tribe. A summary of the presumably primitive and specialized external morphological characters observed in the tribe is presented in Table 2. None of the genera possess all of the primitive or all of the specialized characters listed.

The Gryphalini of North America represent only a fraction (less than one-tenth) of the total number of genera and species belonging to this group throughout the world. They are primarily tropical in distribution and partly because of this many of them have been named from only one or two specimens and assigned to genera to which they are completely unrelated. For this reason a thorough study of their phylogeny is impossible until larger series of the tropical species are available.

The subfamily Ipinæ geologically is very young as indicated (Schedl, 1952a) by its complete absence from Baltic amber or other fossil records of comparable age, although other scolytid groups with similar habits are quite common in amber. For this reason a knowledge of their

TABLE 2

A summary of the primitive and specialized external morphological characters observed in the Cryphalini.

Primitive	Specialized
Sexes similar in size and appearance.	Sexual dimorphism pronounced, males reduced in size.
Body size large.	Body size small.
Frons evenly convex.	Frons with carinae, tubercles, or impressions.
Eye elongate, entire, and finely granulate.	Eye short, oval, emarginate, and coarsely granulate.
Antennal funicle five-segmented.	Antennal funicle three-segmented.
Antennal club septate, the sutures straight.	Antennal club aseptate, the sutures procurved or recurved.
Fine raised line on basal margin of pronotum indistinct.	Fine raised line on basal margin of pronotum distinct.
Fine raised line on lateral margin of pronotum absent.	Fine raised line on lateral margin of pronotum distinct.
Asperities of pronotum small and abundant.	Asperities of pronotum large and sparse.
Anterior margin of pronotum broadly rounded.	Anterior margin of pronotum produced.
Summit of pronotum at middle.	Summit of pronotum near base.
Striae and strial punctures large and distinct.	Striae and strial punctures reduced, obscure, or absent.

TABLE 2 (continued)

Primitive	Specialized
Interstitial punctures abundant, and confused.	Interstitial punctures evenly spaced in uniserial rows.
Short interstitial setae scale-like.	Short interstitial setae hair-like, or absent.
Interstitial bristles widely spaced, in irregular rows.	Interstitial bristles closely placed, in uniserial rows.
Declivity uniformly convex.	Declivity with impressions, elevations, or granules.
Posterior costal margins of elytra ascending slightly.	Posterior costal margins of elytra ascending conspicuously.
Tibiae broad, with several teeth.	Tibiae slender, with few teeth.
Third tarsal segments cylindrical.	Third tarsal segments broad, or compressed.

phylogeny must be derived from the analysis of biological and morphological data.

The decision as to whether a character is primitive or specialized was based on such reasoning as the following. One of the most prominent divisions in the group is between the ordinary monogamous habit, involving the similarity of males and females, of the Gryphalus group of genera (including Procryphalus, Ernopocerus, Gryphalus, Gryphalomorphus, Hypocryphalus and Taenioglyptes), and that

of the Hypothenemus group of genera (including Cryptocarenum, Stephanoderes, Hypothenemus, and Trischidias) in which the male is conspicuously different morphologically from the female and does not join her in the new gallery. Since the similarity of sexes occurs primarily in the more primitive groups of scolytids and of beetles generally, and sexual dimorphism only in those which are highly specialized, it must be concluded that the former group of genera is the more primitive, and the latter group the more specialized. It follows that in the Cryphalini the ordinary monogamous habit is more primitive than the behavior of the Hypothenemus group. In the Cryphalus group the eye may be elongate and is usually entire, the fine, raised, basal and lateral lines on the pronotum may be obscure or absent, the posterior costal margins of the elytra may ascend only slightly, the short interstitial setae usually are scale-like, and the hind tibiae (with one exception) are rather broad, bearing teeth on both the distal and lateral margins; all of these characters are absent from the Hypothenemus group of genera, but do indicate a relationship with the more primitive genera in other scolytid groups, and therefore must be considered primitive. In the Hypothenemus group the eye is emarginate (except Trischidias); carinae, tubercles, or narrow impressions may occur on the frons; the fine raised basal and lateral lines of the pronotum are always present; the

short interstitial setae are either hair-like or absent (with one exception); the interstitial punctures may be reduced to a single row; and the posterior tibiae usually bear teeth only on the distal margins. These characters are limited to the Hypothenemus group, and since to a large extent they contrast with those of the more primitive genera in other scolytid groups they are considered as specializations within the tribe Cryphalini.

Within the Cryphalus group some genera exhibit a greater number of the primitive or of the specialized characters than others; for example, all of the characters mentioned in the above paragraph as primitive are found in Procryphalus, and all except the elongate eye are found in Ernopocerus. On the other hand, Taenioglyptes and Hypocryphalus have several specialized characters such as the emarginate eye, the acute lateral margins of the pronotum, the distinctly ascending posterior costal margins of the elytra, etc., and therefore are considered more specialized than Procryphalus and Ernopocerus. The specialization of characters in Cryphalus and Cryphalomorphus is somewhat intermediate between these extremes.

Of the four genera in the more specialized group Trischidias quite obviously was derived from Hypothenemus and may represent only a specialized division of that genus. Stephanoderes and Hypothenemus are very closely allied, so much so that most of their distinguishing characters

intergrade to such a degree that it is extremely difficult to distinguish them; additional information derived from tropical species eventually may result in the submergence of the name Stephanoderes. Cryptocarenum is entirely distinct from, but allied to Stephanoderes and possibly derived from this or a similar genus as indicated by the five segmented antennal funicle, the loss of the septum of the antennal club, the reduction or complete absence of the short elytral setae, and the shape and arrangement of teeth on the tibiae. These genera evidently descended from a common parental stock after the principal Cryphalus-Hypocryphalus characters had been acquired.

A thorough consideration of phylogeny in the tribe is quite impossible until representatives of a large portion of the tropical genera and species are available for study. Even minor divisions within some of the genera are known to be world wide in distribution; consequently the species of most North American genera are polyphyletic in origin thereby increasing this difficulty.

METHODS

At the time each series was obtained, except for the most common host species, a sample of the host plant was selected, pressed, and later submitted to specialists for determination. In the case of introduced ornamentals at the Subtropical Experiment Station in Homestead, Florida,

the names were obtained from tags attached to the plants.

The beetles (at least those collected by the author) were killed and preserved in 70 per cent ethyl alcohol; series of them were later mounted on paper points by the usual method to facilitate detailed study with a binocular microscope at magnifications up to 96 diameters. Tibiae and antennae were removed from dry specimens and mounted on glass slides either in Canada balsam or diaphane for study with a compound microscope at magnifications up to 440 diameters. The illustrations were prepared either from the dry specimens or from the prepared slides with the aid of an ocular grid.

Measurements of length and width of the body, antennal club, and pronotum were made with the aid of an ocular micrometer. The figures given for the relative measurements of these parts should be used with caution, since twisting or extension of intersegmental membranes of the thorax and (to a lesser extent) of the antennal club and the difficulty of measuring the pronotum from exactly the same angle with respect to the axis of the body cause distortion sufficient to greatly alter the measurements. The marginal teeth of the pronotum were not included in the measurement of the body or pronotum.

After completing the descriptive portion of the systematic section the Leconte collection at the Museum of Comparative Zoology, and the Hopkins, Blackman, and Eggers

collections at the United States National Museum were visited in order to study the types of species included. Of the species treated here as native (and Stephanoderes rufescens), including their synonyms, the type specimen of each has been personally examined with the following exceptions. The type of Cryphalus striatulus is lost; the type of Cosmoderes schwarzi is lost except for a balsam mount of the antenna (which was examined); cotypes of Cryphalus amabilis and C. grandis, and paratypes (?) of Trypophloeus nitidus were examined, their types could not be located and may never have been designated; the type of Cryphalus mangiferae was not available, but the type of Eggers' synonym, Hypocrypnalus mangiferae, which he compared with the type of this species, was examined; the types of Stephanoderes chapuisii, S. rotundicollis, S. sculpturatus, and S. seriatus evidently are lost, presumably authentic specimens received from Eichhoff and comparing favorably with the original descriptions were examined; a specimen from Mexico compared with the type of Hylesinus obscurus by Eggers was used as the basis for this species; and specimens from the type series of Hypothenemus eruditus and H. citri were examined as the types were not available.

SYSTEMATIC SECTION

Key to the Genera of North American Cryphalini

1. Pronotum without a fine, raised, lateral line (an indistinct line in Cryphalomorphus); eye sometimes sinuate, never emarginate; costal margin of elytra ascending only slightly posteriorly 2

Pronotum acutely margined at the sides, and with a fine, raised line at least on the basal one-third; eye emarginate (except Trischidias); costal margins of elytra distinctly ascending posteriorly 5

2. Antennal funicle five segmented; antennal club narrow, pointed at tip, sutures straight, not septate; basal half of pronotum without scale-like setae ...

Cryphalus Erichson

Antennal funicle four segmented; antennal club broadly rounded at the tip, the sutures curved, partly septate, or both; basal half of pronotum with scale-like setae 3

3. Antennal club not septate, sutures indicated by three strongly procurved rows of setae
..... Ernopocerus Balachowsky

Antennal club with at least part of first suture septate, none of sutures indicated by strongly pro-

- curved rows of setae 4
4. Sutures of antennal club straight, the first septate; anterior margin of pronotum slightly produced; pronotum with no indication of a fine, raised, lateral line Procryphalus Hopkins
- Antennal club with a strongly oblique septum on one side, no other sutures indicated; anterior margin of pronotum broadly rounded; pronotum with an indistinct, fine, raised, lateral line
..... Cryphalomorphus Schaufuss
5. Antennal club not septate, with sutures indicated by rather strongly recurved rows of setae; third tarsal segments broad and emarginate Taenioglyptes Bedel
- Sutures of antennal club straight or procurved; third tarsal segments cylindrical 6
6. Antennal funicle five segmented (male usually four segmented); eye distinctly emarginate; body size greater than 1.4 mm. (except some Stephanoderes brunneus and S. sparsus 7
- Antennal funicle three or four segmented; eye sinuate to indistinctly emarginate; body size less than 1.4 mm. 9

7. Strial punctures obsolete; posterior half of pronotum finely granulate; antennal club large, not septate; male and female similar in size and appearance Hypocryphalus Hopkins
- Strial punctures distinct; posterior half of pronotum not closely granulate, usually punctate; male much smaller than female 8
8. Antennal club not septate; raised lateral margin of pronotum extending two-thirds of distance from basal margin to anterior lateral margin; elytra glabrous except for a few subcapitate interstitial bristles .
..... Cryptocarenus Eggers
- First suture of antennal club partly septate; raised lateral margin extending only one-third of distance from basal to anterior lateral margin; elytra clothed with rows of strial and interstitial setae
..... Stephanoderes Eichhoff
9. First suture of antennal club partly septate; body slender, more than 2.4 times as long as wide; striae and strial punctures not as strongly impressed; usually larger than 1.1 mm. Hypothenemus Westwood
- Antennal club not septate; body stout, less than 2.3 times as long as wide; striae and strial punctures more strongly impressed; smaller than 1.1 mm.
..... Trischidias Hopkins

Procryphalus Hopkins

Procryphalus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 33; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 90; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 340; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 320.

The genus Procryphalus is distinguished from the other North American genera of Cryphalini by the absence of a distinct raised line on the basal and lateral margins of the pronotum, the presence of a complete septum in the first suture of the antennal club, and by the only slightly ascending posterior costal margins of the elytra. It is evidently more closely allied to Ernopocerus and Cryphalus than to other Holarctic genera.

Frons convex, rather broad, punctured, with scanty pubescence. Eye elongate-oval, about three times as long as wide, entire, and finely granulate. Antennal club elongate-oval, indistinctly constricted, with two distinct, straight sutures, the first completely septate, the second indicated by setae, the third rather obscure; funicle four-segmented, the fourth segment only slightly wider than the second.

Pronotum about equal in length and width; fine elevated line on the lateral margin of pronotum absent,

obscure or absent on the basal margin; summit in front of the middle; asperate anterior and lateral to summit, asperities rather small, numerous; anterior-median margin slightly produced and armed with several teeth. Fore tibiae with teeth confined to the distal two-fifths of outer margin. Hind tibiae broad, with five teeth on distal one-fourth. Third tarsal segments cylindrical.

Elytral striae distinct or not, punctures variable; interstriae granulate-punctate; declivity rather steep, convex, without special elevations or impressions; vestiture consisting of abundant, short, semi-erect, scale-like setae, and uniserial rows of rather sparse, longer, interstitial, scale-like bristles.

The sexes are similar in size and proportions, but may be distinguished by the terga of the seventh and eighth segments.

TYPE SPECIES: (Procryphalus populi Hopkins=) Gryphalus mucronatus Leconte, original designation.

Key to the species of Procryphalus

1. Strial punctures large, close; interstriae narrower than striae, punctures fine, sparse, surface smooth except for punctures; in Acer macrophyllum aceris

Strial punctures of small to medium size; interstriae as wide or wider than striae, punctures more

- numerous, confused, surface granulate, at least
near the elytral base 2
2. Smaller than 1.7 mm.; frons rather sparsely,
shallowly punctured; interstriae more sparsely,
finely punctured on posterior three-fourths of
disc; in Salix scouleriana utahensis
- Larger than 1.8 mm.; frons coarsely, rather deeply
punctured; interstriae densely, rather coarsely
granulate-punctate over entire disc; in Populus
tremuloides mucronatus

Procryphalus aceris Hopkins
(Figs. 46, 85)

Procryphalus aceris Hopkins, 1915, U.S. Dept.
Agr., Rep. No. 99, p. 33; Chamberlin, 1917, Can. Ent.,
vol. 49, p. 355; Chamberlin, 1939, The Bark and Timber
Beetles of North America North of Mexico, p. 321.

The strial punctures larger, the interspaces
much narrower than the striae, the interspacial punctures
fine, less numerous and more nearly in uniserial rows,
and the pronotum with only six marginal teeth separate
this species from the closely allied P. utahensis.

FEMALE: Length 1.55-1.65 mm., about 2.8 times as long as
wide, body color dark brown to black.

Frons weakly convex, moderately, shallowly punctured, slightly impressed above the epistoma, an indistinct median ridge extending from the upper level of the eyes to the epistomal margin; pubescence consisting of inconspicuous, sparse, fine, long hair. Eye elongate-oval, slightly wider above, about three times as long as wide, entire. Antennae missing from the two specimens at hand.

Pronotum about as long as wide; rather strongly produced on anterior-median margin and armed with six teeth, the third pair smaller and more widely spaced; summit anterior to middle; asperate in front of and to the sides of summit; asperities rather small, abundant; posterior and lateral areas rugose, sparsely, coarsely granulate-punctate; pubescence consisting of moderately long hair-like setae on the asperate area, and rather short, narrow scale-like setae on the granulate-punctate area.

Elytra shining; striae not impressed, the punctures large, deep, distinct, separated by slightly less than their own diameters; interstriae much narrower than the striae, the surface smooth except for small, widely spaced, usually subgranulate punctures, not coarsely granulate near the base. Declivity steep, convex; strial and interstitial punctures reduced in size and not as deep as on the disc. Elytral vestiture consisting of abundant,

short, confused, semi-recumbent, interstitial scale-like setae, and longer, rather sparse, uniserial rows of scale-like interstitial bristles.

MALE: Similar to the female.

TYPE LOCALITY: Albany, Oregon.

HOST: Acer macrophyllum.

DISTRIBUTION: Known only from the type locality.

The type specimen of P. aceris is located in the U.S. National Museum.

Procryphalus utahensis Hopkins
(Figs. 6, 7, 25, 33, 47, 86)

Procryphalus utahensis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 33; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 321; Wood, 1951, Proc. Utah Acad. Sci., vol. 26, p. 128.

Procryphalus salicis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 33; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 321.

This species is somewhat intermediate between P. mucronatus and P. aceris, differing from both by the presence (normally) of eight teeth on the anterior margin of the pronotum, and the anterior one-sixth of the elytral interstriae much more coarsely granulate-punctate than on the posterior two-thirds of the disc.

FEMALE: Length 1.5-1.7 mm., 2.73 times as long as wide, body color dark brown to black.

Frons weakly convex, moderately, shallowly punctured, weakly impressed above the epistoma, an indistinct median ridge extending from upper level of eyes to epistomal margin; pubescence consisting of inconspicuous, sparse, fine, long hair. Eye elongate-oval, slightly wider above, about three times as long as wide, entire. Antennal club longer than scape, about 1.60 times as long as wide, with three straight sutures on anterior face, the first suture septate.

Pronotum about as long as wide; rather strongly produced on anterior-median margin, and armed with eight teeth, the third and fourth pair smaller and more widely spaced, often submarginal; summit anterior to middle; asperate in front of and to sides of summit, the asperities rather small, abundant; posterior and lateral areas rugose, sparsely, coarsely granulate-punctate; pubescence consisting of moderately long hair-like setae on asperate area, and rather short, narrow, scale-like setae on the granulate-punctate area.

Elytra shining; striae not impressed, punctures of moderate size and depth, usually separated by a distance greater than their own diameters (irregular); interstriae as wide or wider than striae, their surface finely, not closely granulate-punctate, rather coarsely granulate near

elytral base. Declivity steep, convex; strial and inter-strial punctures reduced in size, and not as deep as on the disc. Elytral vestiture consisting of abundant, short, confused, semi-recumbent, interstitial, scale-like setae; and longer, rather sparse, uniserial rows of scale-like bristles.

MALE: Similar to the female.

TYPE LOCALITY: Alta, Utah.

HOSTS: Salix scouleriana, and Salix sp.

DISTRIBUTION: Probably throughout the range of the host tree in the western United States and in Canada. Specimens from the following localities have been examined.

CALIFORNIA: Madera. COLORADO: Fort Collins. IDAHO:

Minadoka National Forest. SOUTH DAKOTA: Black Hills.

UTAH: Alta, and Logan Canyon. BRITISH COLUMBIA: Copper Mountain. QUEBEC: Laniel.

The type specimens of P. utahensis and P. salicis are located in the U.S. National Museum.

Procryphalus mucronatus (Leconte)
(Figs. 48, 87)

Gryphalus mucronatus Leconte, 1879, U.S. Dept. Int., Geol. Geogr. Survey Bull. No. 5, p. 518; Schwarz, 1886, Ent. Amer., vol. 2, p. 42.

Procryphalus mucronatus, Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 33; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 322.

Procryphalus idahoensis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 34; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 321.

Procryphalus populi Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 34; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 321; Wood, 1951, Proc. Utah Acad. Sci., vol. 26, p. 128.

This species is closely allied to P. utahensis, but distinguished by the larger size, the more coarsely, closely punctured frons, the more strongly produced anterior pronotal margin with only six teeth, and the more coarsely, closely granulate-punctate elytral interspaces.

FEMALE: Length 1.8-2.2 mm., 2.54 times as long as wide, body color black.

Frons slightly convex to indistinctly impressed, coarsely, closely, deeply punctured, weakly impressed above the epistoma, an indistinct median ridge extending from upper level of eyes to epistomal margin; pubescence consisting of inconspicuous, sparse, fine long hair. Eye elongate-oval, slightly wider above, entire. Antennal club longer than scape, about 1.62 times as long as wide, with two straight sutures on the anterior face, the first suture septate.

Pronotum about as long as wide; strongly produced on anterior-median margin and armed with six teeth, the third pair much smaller and more widely spaced, located at base of produced area; summit anterior to middle; asperate in front of and to sides of summit, the asperities rather small, abundant; posterior-lateral areas rather coarsely, strongly granulate-punctate; pubescence consisting of moderately long hair-like setae on asperate area, and rather short, narrow, scale-like setae on granulate-punctate area.

Elytra shining; striae not impressed, the punctures of moderate size, not always distinct or regularly spaced; interstriae about equal in width to striae, the surface coarsely, closely granulate-punctate. Declivity steep, convex; strial and interstitial punctures reduced in size and not as deep as on disc. Elytral vestiture consisting of abundant, short, confused, semi-recumbent, interstitial, scale-like setae; and longer, rather sparse, uniserial rows of scale-like, interstitial bristles.

MALE: Similar to the female.

TYPE LOCALITY: La Veta Pass, Colorado.

HOST: Populus tremuloides.

DISTRIBUTION: The high mountains of Colorado, Utah, eastern Nevada, and southern Idaho. Specimens from the following localities have been examined. COLORADO: Gould,

La Veta Pass, and Tercio. IDAHO: Beaver Canyon, and Franklin Basin. NEVADA: Baker. UTAH: Beaver, and Logan Canyon.

The type specimen of Gryphalus mucronatus is located in the Museum of Comparative Zoology; those of P. populi and P. idahoensis are in the U.S. National Museum.

Ernopocerus Balachowsky

Ernopocerus Balachowsky, 1949, Faune de France 50, Coleopteres Scolytides, p. 211.

The genus Ernopocerus was recently established by Balachowsky to include Ernoporus caucasicus and E. fagi from Europe. One North American species, Hopkins' Ernoporus kanawhae, should also be added to Ernopocerus. Since Balachowsky did not designate a type for the genus the first species listed by him is here selected as the type species. If article 25c, paragraph 3, of the International Rules of Zoological Nomenclature, requiring designation of a type species after 1930, is upheld, the generic name Ernopocerus will date from the present publication rather than from 1949.

The genus Ernopocerus is more closely allied to Procryphalus than to other North American genera. It is distinguished from allied genera by the absence of a fine, raised, lateral line on the pronotum and only an indistinct

basal line, the antennal funicle four-segmented, the club subcircular with the sutures indicated by three strongly procurved rows of setae, and the third tarsal segments cylindrical.

Frons convex, finely granulate, with scanty pubescence. Eye sinuate on anterior margin; finely granulate; about two times as long as wide. Antennal club subcircular with three strongly procurved, nonseptate sutures indicated by rows of setae; funicle four-segmented, the fourth segment only slightly wider than the second.

Pronotum about as wide as long; the finely raised lateral line absent, the basal line not clearly indicated; summit at middle; asperate in front of summit, the asperities rather large and quite numerous; anterior-median margin armed with two to four teeth.

Elytral striae distinct, the punctures rather small; interstriae rather coarsely punctured; declivity rather steep, convex; vestiture consisting of abundant, short, scale-like setae, and uniserial rows of longer, widely spaced, scale-like interstitial bristles.

The sexes are similar, but separated by differences of the seventh and eighth abdominal terga.

TYPE SPECIES: Ernoporus caucasicus Lindemann, present designation.

Ernopocerus kanawhae (Hopkins)

Ernoporus kanawhae Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 35; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 605; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 317.

This species is known only from the type specimen; it is closely allied to, but entirely distinct from, E. caucasicus of Europe.

FEMALE: Frons convex, finely granulate; pubescence consisting of rather short, moderately abundant hair. Eye sinuate on anterior margin; finely granulate. Antennal club large, subcircular in outline, with three strongly procurved sutures indicated by rows of setae; not septate.

Pronotum rather broadly rounded in front, armed with four small marginal teeth; summit near middle; anterior slope with numerous, rather small asperities; posterior area with widely spaced granulate punctures, the surface shining although not entirely smooth; pubescence hair-like in asperate area, short scales behind.

Elytra shining; striae not impressed, the punctures very small, distinct, not deep, spaced by about twice their own diameters (irregular); interstriae two to three times as wide as the striae, the punctures rather coarse, shallow, confused, subgranulate. Declivity rather

steep, convex; striae obsolete. Elytral vestiture consisting of short, rather narrow, abundant scale-like setae; and uniserial rows of rather widely spaced, scale-like, interstitial bristles, each bristle about one and one-half times as long as wide, and about one and one-half times as long as the shorter, more abundant, interstitial scales.

TYPE LOCALITY: Kanawha Station, West Virginia.

DISTRIBUTION: Known only from the unique type which was taken in flight.

The type specimen of E. kanawhae is located in the U.S. National Museum.

Cryphalus Erichson

Cryphalus Erichson, 1836, Archiv. für Naturgesch., vol. 1, p. 61; Thomson, 1859, Skandinavians Coleoptera Synoptiskt Bearbetade, p. 146; Eichhoff, 1864, Berlin Ent. Zeit., vol. 8, pp. 34, 45; Leconte, 1876, Proc. Amer. Phil. Soc., vol. 15, p. 361; Leconte and Horn, 1883, Coleoptera of North America, p. 518; Goz, 1885, Rev. d'Ent., vol. 4, p. 278; Bedel, 1888, Fauna Coleoptera du Bassin de la Seine, vol. 6, pp. 396, 397; Reitter, 1894, Verh. Naturf. Vereines Brünn, vol. 33, p. 69; Barbey, 1901, Les Scolytides de l'Europe Centrale, p. 69; Hagedorn, 1910, Coleopterorum

Catalogus, pars 4, p. 40; Hagedorn, 1910, Genera Insectorum, fasc. 111, p. 84.

Trypophloeus Fairmaire, 1868, Faune Ent. France, vol. 4, p. 105; Klimesch, 1913, Ent. Blätt., vol. 9, p. 105; Reitter, 1913, Wien. Ent. Ziet., vol. 32, pp. 69-71; Klimesch, 1914, Ent. Blätt., vol. 10, p. 231; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 36; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 605; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 90; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 340; Peyerimhoff, 1935, Bull. Soc. Ent. France, vol. 40, pp. 194-195; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 322; Balachowsky, 1949, Faune de France 50, Coleopteres Scolytides, p. 213.

Glyptoderus Eichhoff, 1879, Ratio Tomycinorum, p. 137; Eichhoff, 1881, Europäischen Borkenkäfer, p. 187.

Erichson (1836) described the genus Cryphalus to include Apate tiliae Panzer, A. fagi Fabricius, and Bostrichus asperatus Gyllenhal. Thomson (1859) designated B. asperatus as the type of the genus Cryphalus and assigned A. tiliae to his monobasic subgenus Ernoporus. Later, he (1865) also transferred A. fagi to Ernoporus, leaving B. asperatus as the only representative of the genus Cryphalus as it was originally established. The monobasic genus

Trypophloeus was described by Fairmaire (1868) to include Bostrichus binodulus Ratzeburg. It was later established by Eichhoff (1881) that B. asperatus and B. binodulus were synonymous. Subsequent authors, not recognizing B. asperatus as the type of Cryphalus, retained the name Trypophloeus since the asperatus group of species was generically distinct from the then current concept of the genus Cryphalus. Eichhoff (1879), unaware of Fairmaire's genus Trypophloeus, erected Glyptoderus with Bostrichus binodulus Ratzeburg as the type (assigned by Hopkins in 1914).

Since Cryphalus Erichson (1836), Trypophloeus Fairmaire (1868), and Glyptoderus Eichhoff (1879) all have Bostrichus asperatus Gyllenhal (= Bostrichus binodulus Ratzeburg) as the type species, it is quite obvious that they are synonymous, and that the name Cryphalus has priority. The genus formerly designated by the name Cryphalus must now take the name Taenioglyptes Bedel (1888) with Bostrichus piceae Ratzeburg as the type species. It is most unfortunate that temporary confusion must result from changing names of these large and important genera; however, an orderly system of classification can never be established by ignoring such glaring nomenclatorial discrepancies as these.

The genus Cryphalus is more closely allied to Taenioglyptes than to other North American genera. It is

distinguished from allied genera by the absence of a distinctly raised lateral line on the pronotum (the basal line is present); the antennal funicle five-segmented; the club slender, distally pointed, with three straight sutures indicated by rows of setae; and the third tarsal segment cylindrical or laterally compressed.

Frons weakly convex to plano-concave, punctured, with scanty pubescence. Eye elongate-ovate, about two to two and one-fifth times as long as wide, wider above; finely granulate; entire or with two or three facets absent suggesting an emargination. Antennal club elongate, tapered at both ends, indistinctly constricted at the first and second sutures, three straight sutures indicated by rows of setae; funicle five-segmented, the fifth segment much wider than the second.

Pronotum wider than long; a fine, elevated, basal line present, the lateral lines absent; summit slightly behind middle; asperate anterior to summit, the asperities rather large, broad, and numerous; anterior-median margin slightly produced and armed with several teeth. Fore tibiae broadened distally, with about eight teeth on outer margin of distal one-third. Hind tibiae with about six teeth on distal one-third. The third tarsal segments slightly compressed laterally.

Elytral striae distinct or not, the punctures variable; interstriae punctured, usually with a single row

of granules in addition; declivity rather steep, often with a broad impression between the first and fourth interstriae, the posterior extremity of the fourth interstriae usually prominent, often bearing granules of variable size; vestiture consisting of abundant short scale- or hair-like setae, and uniserial rows of rather widely spaced, interstitial, scale- or hair-like bristles.

The sexes are similar, although there may be a tendency for the males to be slightly smaller. They are easily separated by differences of the seventh and eighth abdominal terga.

TYPE SPECIES: Bostrichus asperatus Gyllenhal, subsequent designation (Thomson, 1859).

Key to the Species of Cryphalus

1. Strial punctures impressed, at least on basal one-fourth, their greatest diameter about equal in width to adjacent interstriae; vestiture hair-like at least on anterior one-half of elytra; declivital bristles distinctly longer than one-half of distance between rows of bristles 2

Strial punctures obscure, much narrower than interstriae; elytral vestiture at least on posterior three-fourths scale-like; declivital bristles not

longer than one-half the distance between rows of
bristles 3

2. Strial punctures coarse, deep, at least on basal
one-half; punctures on posterior-lateral areas of
pronotum rather large, deep, and close; scale-like
pubescence confined to declivity nitidus

Strial punctures greatly reduced except on basal
one-fourth; punctures on posterior-lateral areas of
pronotum rather small, shallow, not as close; scale-
like pubescence covering posterior half of elytra .

salicis

3. Posterior extremity of fourth interspace either
smooth, or with minute rounded granules; the short,
abundant elytral scales broad, rounded distally;
frons usually not subconcavely impressed populi

Posterior extremity of fourth interspace with a
row of one to five small, slender teeth, each at
least twice as long as its basal width; the short,
abundant elytral scales acuminate; frons usually
subconcavely impressed thatcheri

Cryphalus nitidus (Swaine)
(Figs. 43, 88)

Trypophloeus nitidus Swaine, 1912, Can. Ent.,
vol. 14, p. 349; Blatchley and Leng, 1916, Rhynchophora of

North Eastern America, p. 605; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 90; Dodge, 1938, Minn. Agr. Exp. Sta., Tech. Bull. 132, p. 39; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 323.

Trypophloeus punctipennis Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 37; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 323; Wood, 1951, Proc. Utah Acad. Sci., vol. 26, p. 128.

The coarse striae extending at least two-thirds of the distance from the elytral base to the declivity, and the absence of scale-like pubescence, except to a limited extent on the declivity, distinguish this species from other North American representatives of this genus.

FEMALE: Length 1.6-2.0 mm., 2.45 times as long as wide, body color black.

Frons convex, with a Y-shaped (variable) impression beginning above upper level of eyes, branching above the epistoma and continuing to edge of antennal sockets; surface coarsely reticulate above upper level of eyes, coarsely, shallowly, closely punctured below; pubescence consisting of inconspicuous, fine, sparse hair of medium length. Eye elongate-ovate, wider above, about 2.2 times as long as wide, finely granulate; entire or

with two or three facets missing suggesting an emargination. Antennal club longer than scape, about 1.69 times as long as wide, with three straight sutures indicated by rows of setae.

Pronotum $0.9\frac{1}{4}$ times as long as wide; anterior margin slightly produced, with four to eight contiguous or subcontiguous teeth, the lateral ones reduced in size; summit slightly behind middle; asperate in front of summit, the asperities rather large, abundant; posterior and lateral areas shining, the punctures rather close, coarse, quite deep; pubescence consisting of rather short, fine, erect hair, slightly longer in the asperate area.

Elytra shining; striae not impressed, the punctures rather coarse and deeply impressed on anterior two-thirds of disc, usually becoming smaller and shallow near declivity; interstriae (anteriorly) about as wide as striae, becoming crenulate basally on disc, the punctures fine, shallow, confused, rather abundant, subgranulate anteriorly. Declivity rather steep, convex; striae weakly impressed, the punctures reduced; interstriae each with a uniserial row of small, rather widely spaced granules. Elytral vestiture on disc and sides consisting of rather abundant, short, hair-like, strial and interstitial setae; and uniserial rows of longer hair-like bristles; on declivity both short and long setae become stout and more nearly scale-like.

MALE: Similar to the female.

TYPE LOCALITY: Weymouth, Nova Scotia.

HOSTS: Alnus crispa, A. incana, A. rhombifolia, Salix scouleriana, and S. species.

DISTRIBUTION: This species probably occurs throughout the northern coniferous forests wherever its hosts are found.

Specimens from the following localities have been examined.

IDAHO: Coeur d'Alene. MINNESOTA: Lake County. UTAH: Alta, and Logan Canyon. NOVA SCOTIA: Weymouth. QUEBEC: Laniel.

The type specimen of Trypophloeus nitidus could not be located at this time; that of T. punctipennis is in the U.S. National Museum.

Gryphalus salicis (Hopkins)
(Figs. 44, 89)

Trypophloeus salicis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 36; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 323.

Trypophloeus centralis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 36; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 324.

This species is closely allied to G. nitidus, but differs in having the scale-like pubescence of the elytra

covering the posterior one-half including part of the disc, the stria punctures coarse and impressed on less than the anterior one-third of the elytra, and the punctures on the posterior-lateral areas of the pronotum smaller, and shallow.

FEMALE: Length 1.5-1.7 mm., 2.50 times as long as wide, body color dark brown.

Frons flattened on a rather broad area, sub-concave in some of the Washington specimens; rather weakly impressed above the epistoma, with a short median prominence reaching the epistoma; surface coarsely, closely, shallowly punctured at sides and above, indistinctly punctured toward the center; pubescence consisting of inconspicuous, fine, sparse hair of medium length. Eye elongate-ovate, wider above, about 2.2 times as long as wide; finely granulate; entire or with two or three facets missing suggesting an emargination. Antennal club longer than scape, about 1.70 times as long as wide, with three straight sutures indicated by rows of setae.

Pronotum 0.92 times as long as wide; anterior margin very slightly produced, with six subcontiguous teeth (rarely an additional pair of granules), the lateral pair reduced in size; summit slightly behind middle; asperate in front of summit, the asperities rather large, abundant; posterior and lateral areas usually reticulate,

and with small rather close, shallow punctures; pubescence consisting of rather short, fine, erect hair, slightly longer in the asperate area.

Elytra shining; striae not impressed, the punctures rather coarse and quite deep on basal one-fourth of disc, less than one-half as large on posterior three-fourths; interstriae on basal one-fourth only slightly wider than striae, much wider posteriorly, usually sub-crenulate toward the base, the punctures about as large as those of striae on posterior three-fourths of disc, confused; a uniserial row of widely spaced, fine granules on each interspace, each granule bearing an interstitial bristle. Declivity moderately steep, with a broad, shallow impression between the first and fourth interstriae; striae obscure; interstriae each with a row of fine granules, the posterior extremity of the fourth slightly elevated and bearing one to four larger, sharply pointed tooth-like granules. Elytral vestiture consisting of numerous, short, semi-recumbent strial and interstitial setae; and uniserial rows of longer, erect bristles; both types of setae hair-like on the anterior half of elytra, scale-like on the posterior half, particularly on the declivity.

MALE: Similar to the female.

TYPE LOCALITY: Del Monte, California.

HOSTS: Alnus sp., and Salix sp.

DISTRIBUTION: Central California to Washington. Specimens from the following localities have been examined.

CALIFORNIA: Belmont, and Del Monte. WASHINGTON: Easton, and Fort Flagler.

The type specimens of Trypophloeus salicis and T. centralis are located in the U.S. National Museum.

Cryphalus populi (Hopkins)
(Figs. 8, 9, 26, 34, 45, 91)

Trypophloeus populi Hopkins, U.S. Dept. Agri., Rep. No. 99, p. 37; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 323; Wood, 1951, Proc. Utah Acad. Sci., vol. 26, p. 128.

This species is very closely related to C. thatcheri, differing only by the absence of small, slender teeth at the posterior end of the fourth elytral interspace, the short abundant elytral scales much wider and rounded distally, and the frons usually not as deeply impressed. It is entirely possible that the two forms are only subspecifically distinct; additional information of their biology and distribution are necessary to determine this. The two species differ from other North American representatives of the genus by the presence of scale-like pubescence covering the elytra from the base to the posterior margin, and the striae punctures obscure throughout their length.

FEMALE: Length 1.7-2.1 mm., 2.30 times as long as wide, body color black.

Frons variable, flattened or weakly convex, rather weakly impressed above the epistoma, occasionally with a more or less distinct median impression or elevation; surface coarsely reticulate above the eyes, closely, coarsely rather deeply punctured below; pubescence consisting of inconspicuous, fine, sparse hair of medium length. Eye elongate-ovate, wider above, two times as long as wide; finely granulate; entire or with two or three facets missing suggesting an emargination. Antennal club longer than scape, about 1.87 times as long as wide, with three straight sutures indicated by rows of setae.

Pronotum 0.88 times as long as wide; anterior margin slightly produced, with four rather large, sub-contiguous teeth, the median pair larger, often with two additional smaller lateral granules; summit slightly behind middle; asperate in front of summit, the asperities rather large, abundant; posterior and lateral areas shining, the punctures rather close, coarse, quite deep; pubescence consisting of rather short, fine, semi-erect hair, some of these setae stout and almost scale-like on the basal portion.

Elytra shining; striae not impressed, the punctures reduced in size, shallow, usually obscure; inter-striae with numerous fine, confused, shallow punctures about

equal in size to those of striae, usually bearing a uniserial row of widely spaced, fine granules, each granule bearing an interstitial bristle. Declivity rather steep, convex except for a slight impression between the first and fourth interstriae; striae usually obscure; interstriae each with a row of fine granules, the posterior extremity of the fourth very slightly elevated, the granules scarcely larger than on other interspaces. Elytral vestiture consisting of numerous, short, semi-recumbent interstitial scale-like setae; and uniserial rows of rather widely spaced, scale-like bristles, each bristle about two times as long as the shorter scales; both types of setae covering the elytra from the base to the posterior margin.

MALE: Similar to the female.

TYPE LOCALITY: Williams, Arizona.

HOSTS: Populus acuminata, P. angustifolia, P. tremuloides, and P. trichocarpa.

DISTRIBUTION: Eastern Nevada to Colorado, northern Arizona to Saskatchewan and eastward in Canada to New Brunswick. Specimens from the following localities have been examined. **ARIZONA:** Williams. **COLORADO:** Bellvue. **NEVADA:** Baker. **UTAH:** Logan, and Logan Dry Canyon. **MANITOBA:** Aweme. **NEW BRUNSWICK:** Fredericton. **SASKATCHEWAN:** Indian Head.

The type specimen of Trypophloeus populi is located in the U.S. National Museum

Gryphalus thatcheri, new species
(Fig. 90)

This species is very closely allied to C. populi, but differs by the presence of a row of one to five small slender teeth at the posterior end of the fourth elytral interspace, each tooth at least twice as long as its basal width; the short, abundant elytral scales acuminate; and the frons usually subconcavely impressed. Additional knowledge of its distribution and biology may prove it to be only a subspecies of C. populi.

FEMALE: Length 1.5-1.9 mm., 2.26 times as long as wide, body color black.

Frons flattened over a broad area, subconcave in most specimens; surface coarsely, shallowly, closely punctured, usually longitudinally subaciculate; pubescence consisting of inconspicuous, fine, sparse hair of medium length. Eye elongate-ovate, wider above, two times as long as wide; finely granulate; entire or with two or three facets missing suggesting an emargination. Antennal club longer than scape, about 2.2 times as long as wide, with three straight sutures indicated by rows of setae.

Pronotum 0.88 times as long as wide; anterior margin slightly produced and armed with four rather large,

subcontiguous teeth (similar to C. populi), the median pair larger, and often with one or two smaller lateral granules; summit slightly behind middle; asperate in front of summit, the asperities rather large, abundant; posterior and lateral areas shining, the punctures rather large, close, and quite deep, granulate-punctate behind summit; pubescence consisting of rather short, fine, semi-erect hair.

Elytra shining; striae not impressed, the punctures reduced in size, shallow, usually obscure; interstriae with numerous fine, confused, shallow punctures about equal in size to those of the striae, each usually bearing a single uniserial row of widely spaced, fine granules, each granule bearing an interspacial bristle. Declivity rather steep; convex except for a broad, indistinct impression between the first and fourth interstriae; striae usually obscure; interstriae each with a row of small granules; the posterior extremity of the fourth interspace slightly elevated and bearing a row of one to five small, slender, sharply pointed tooth-like granules, each tooth at least twice as long as its basal width. Elytral vestiture consisting of numerous, short, semi-recumbent interstitial scale-like setae, each scale more or less acuminate; and uniserial rows of rather widely spaced, scale-like bristles, each with an interspacial granule at its base, each bristle about two to three times as long as

the shorter scales; both types becoming more nearly hair-like near the elytral base.

MALE: Similar to the female. Since the smallest specimens are males and the largest ones females, the average size of the male may be slightly smaller. Because of the difficulty of determining the sex and the small number of specimens at hand this observation cannot be fully verified

TYPE LOCALITY: Two miles northwest of Blue Lake, Lassen County, California.

HOST: Populus tremuloides.

DISTRIBUTION: Known from the Warner Mountains of northern California south to Pasadena. The female holotype, male allotype, and 35 paratypes were collected two miles northwest of Blue Lake, Lassen County, July 19, 1947, by T. O. Thatcher. In addition 26 paratypes were collected as follows: Warner Mountains, Modoc County, July 10, 1910 (collector unknown); Sonora Pass, Aug. 4, by J. N. Knull; and Pasadena.

The holotype, allotype, and paratypes are located in the Snow Entomological Collections. Additional paratypes are in the collections of the U.S. National Museum, the Canadian National Museum, the California Academy of

Sciences Museum, J. N. Knull, T. O. Thatcher, and the author.

Cryphalus striatulus Mannerheim

Cryphalus striatulus Mannerheim, 1853, Bull.

Mosc., p. 253; Leconte, 1876, Proc. Amer. Phil. Soc., vol. 15, p. 362; Eichhoff, 1879, Ratio ... Tomicinorum, p. 147; Swaine, 1909, N. Y. State Mus., Bull. 134, p. 93.

Procryphalus striatulus, Hopkins, 1915, U.S. Dept.

Agr., Rep. No. 99, p. 33; Swaine, 1914, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 90; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, pp. 315, 321.

The type is evidently lost. The brief description, however, suggests it may either be very similar to or perhaps synonymous with Cryphalus nitidus. Since specimens from the type locality are not available, the status of this species will not be altered at this time. It is rather doubtful that it should be assigned to Procryphalus as was done by Hopkins (1915, p. 33).

Cryphalomorphus Schaufuss

Lepicerus Eichhoff, 1879 (not Motschulsky, 1855),

Ratio ... Tomicinorum, p. 476; Hagedorn, 1910, Coleopterora Catalogus, pars 4, p. 69; Hagedorn, 1910, Genera Insectorum,

fasc. 111, p. 90; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 8.

Cryphalomorphus Schaufuss, 1891, Tijdschr. Ent., vol. 34, p. 12; Hagedorn, 1910, Coleopterorum Catalogus, pars 4, p. 46; Hagedorn, 1910, Genera Insectorum, fasc. 111, p. 83; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 7, Pl. II, fig. 3; Schedl, 1952, Dusenja, vol. 3, p. 344.

Letznerella Reitter, 1913, Wien Ent. Zeit., Jahrg. 32, p. 68; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 90; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 340; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 316; Schedl, 1940, Anales Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 341.

Ernoporides Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 34; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 604; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 340; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 315.

Lepicerinus Hinton, 1936, Ann. Mag. Nat. Hist., Series 10, vol. 17, p. 472; Schedl, 1940, Mitt. Munch. Ent. Ges., vol. 30, p. 587.

Neocryphalus Eggers, 1922, Ent. Bl., vol. 18, p. 169.

Eichhoff described the genus Lepicerus in 1879, with L. aspericollis from Burma as the type species. In 1936, Hinton found the name Lepicerus to be preoccupied and proposed the new name Lepicerinus. Meanwhile, Schaufuss (1891) had described Cryphalomorphus with C. communis from Madagascar as the type species; Reitter (1913) had described Letznerella with Bostrichus jalappae Letzner, from Brazil, as the type species; and Hopkins (1915) had described Ernoporides with E. floridensis as the type species. Following a study of their type species it was established (1940) by Schedl that Cryphalomorphus, Letznerella, Ernoporides, and Lepicerinus were synonymous and he used the name Lepicerinus. However, if these genera are synonymous the name Cryphalomorphus has priority and should be employed to designate this genus as was done by Schedl (1952b, p. 344) at a later date.

The genus Cryphalomorphus is perhaps more closely allied to Ernopocerus than to other North American genera. It differs conspicuously from Ernopocerus by not having the antennal club segmentally marked by rows of setae; the first suture is indicated only by a strongly oblique septum on one side; the marginal teeth of the pronotum are absent, submarginal teeth sometimes are present; and the posterior margins of the elytra ascend only slightly. The sexes are similar.

Frons convex, broad, punctured, with scanty pubescence. Eye entire; finely granulate. Antennal club rather large, subcircular to oval, not constricted or marked by sutures except for a septum in one-half of the strongly oblique first suture; funicle four-segmented, the second segment about as wide as the fourth.

Pronotum about as long as wide; basal margin and posterior one-third of lateral margin with a fine elevated line; asperate in front of summit; teeth usually absent from anterior margin. Fore tibiae with several teeth on distal one-half of outer margin. Hind tibiae with five teeth on distal one-third.

Elytral striae distinct or not, the punctures variable; interstriae with punctures and granules; declivity rather steep, convex, without special elevations or impressions; vestiture consisting of abundant, short, semi-erect, scale- and hair-like strial and interstitial setae, and uniserial rows of erect, long, interstitial, scale-like bristles.

TYPE SPECIES: Cryphalomorphus communis Schaufuss, monobasic.

Key to the Species of Cryphalomorphus

1. Strial punctures rather large, much larger than interstitial punctures; lateral areas of pronotum rather coarsely punctured; larger, 1.6-1.8 mm. jalappae

Strial punctures only slightly larger than inter-
 strial punctures; lateral areas of pronotum very
 finely punctured; smaller, 1.25-1.55 mm.

..... floridensis

Gryphalomorphus jalappae (Letzner)

This exotic species is occasionally obtained
 from Jalapa roots imported from Mexico. It differs from
C. floridensis by the more coarsely punctured lateral
 areas of the pronotum, the much larger strial punctures,
 and the larger size (1.6-1.8 mm.).

Gryphalomorphus floridensis (Hopkins)
 (Figs. 10, 11, 27, 35, 49, 92)

Ernoporides floridensis Hopkins, 1915, U.S. Dept.
 Agr., Rep. No. 99, p. 34; Blatchley and Leng, 1916,
 Rhynchophora of North Eastern America, p. 604; Chamberlin,
 1939, The Bark and Timber Beetles of North America North of
 Mexico, p. 315.

Lepicerinus floridensis, Schedl, 1940, Mitt.
 Münch. Ent. Ges., vol. 30, p. 588.

This is the only representative of this genus
 known to breed in the United States. It is not likely to
 be confused with native species of allied genera.

FEMALE: Length 1.25-1.55 mm., 2.6 times as long as wide,
 body color dark brown.

Frons convex, with an indistinct, median, longitudinal elevation, and a weak transverse impression above the epistoma; surface with coarse, close, deep punctures above; punctures reduced in size, and shallow in the transverse impression; reticulate above frons. Eye entire; finely granulate. Antennal club slightly longer than scape, 1.44 times as long as wide, one-half of the first suture septate, strongly oblique; the other sutures not evident.

Pronotum equal in length and width; usually with two submarginal teeth, their position variable; summit at middle; asperate in front of summit, the asperities rather small, numerous; posterior-lateral areas finely, rather closely punctured, sparsely granulate behind summit; pubescence consisting of rather short, semirecumbent, hair-like setae, intermixed on posterior half with equally long scale-like setae.

Elytra shining; striae not impressed, the punctures very fine, rather deep, separated by a distance greater than their own diameters; interstriae about three times as wide as striae, the punctures numerous, confused, slightly smaller than strial punctures, each giving rise to a short hair- or scale-like seta, in addition uniserial rows of widely spaced granules give rise to scale-like bristles. Declivity rather steep, convex; strial punctures slightly larger, and the interstitial granules closer than

on disc. Elytral vestiture consisting of short, rather abundant, semi-erect strial and interstrial hair- and scale-like setae; and uniserial rows of long, erect, rather narrow scale-like interstrial bristles.

MALE: The sexes are similar, but the average size of the male is slightly smaller than that of the female.

TYPE LOCALITY: Biscayne, Florida.

HOSTS: Candiosperma holacacobium, and Ipomeoa pes-caprae.

DISTRIBUTION: Specimens from Plantation Key and Sugar Loaf Key, Florida, have been examined.

The type specimen of Ernoporides floridensis is located in the U.S. National Museum.

Hypocryphalus Hopkins

Hypocryphalus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 41; Beeson, 1938, Fed. Malay States Mus. Jour., vol. 18, p. 288; Schedl, 1938, Trans. Roy. Soc. South Australia, vol. 62, p. 48.

Dacryphalus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 42.

This genus is allied to Taenioglyptes, but has the antennal funicle five-segmented, the sutures of the antennal club procurved, the tarsi more slender, with the

third segment not as broad, and the tibiae more slender. It is represented in North America by only one species recently introduced into southern Florida.

Frons broad, convex above, slightly flattened below; epistomal margin with a short, ventrally directed brush. Eye emarginate; finely granulate. Antennal funicle five-segmented in both sexes; club large, sub-circular, with three procurved sutures marked only by rows of setae.

Pronotum slightly wider than long; basal and posterior one-third of lateral margin with a fine elevated line; asperate in front of summit, with about four to eight teeth on anterior margin. Fore tibiae rather slender, with six teeth on distal two-fifths of outer margin. Hind tibiae slender, with three or four teeth on distal margin.

Elytral striae impressed or not, the punctures obscure; interstriae rather wide, densely clothed with short, recumbent hair-like setae, and with uniserial rows of erect bristles; declivity not steep, convex.

Sexes similar in general appearance, the posterior margin of the fifth abdominal segment more broadly rounded (subtruncate) in the male.

TYPE SPECIES: Hypocryphalus rotundus Hopkins, original designation.

Hypocryphalus mangiferae (Stebbing)
(Figs. 14, 15, 29, 37, 53)

Cryphalus mangiferae Stebbing, 1914, Indian Forest Insects, p. 542; Schedl, 1942, Tijdschr. Ent., vol. 85, p. 2.

Dacryphalus mangiferae, Hopkins, 1927, Bull. Ent. Research, vol. 18, p. 28.

Hypocryphalus mangiferae, Beeson, 1929, Insects of Samoa, vol. 4, p. 226; Eggers, 1931, Wiener Ent. Zeit., vol. 47, p. 185; Beeson, 1938, Fed. Malay States Mus. Jour., vol. 18, p. 288; Beeson, 1940, B. P. Bishop Mus., Occas. Papers, vol. 15, p. 198; Schedl, 1942, Kolonialforst. Mitt., vol. 5, p. 176; Blackwelder, 1948, Fifth Supplement to the Leng Catalogue of Coleoptera of America north of Mexico, p. 49; Swezey, 1949, Proc. Hawaiian Ent. Soc., vol. 13, p. 445.

Hypocryphalus mangiferae Eggers, 1928 (not Stebbing, 1914), Inst. Biol. (Sao Paulo) Arquivos, vol. 1, p. 85; Costa Lima, 1929, Mem. Inst. Oswaldo Cruz, Suppl. No. 8, p. 110.

FEMALE: Length 1.6-1.9 mm., about 2.20 times as long as wide, body color dark yellowish-brown.

Frons broad, convex above, more or less flattened below; surface finely aciculate, reticulate above frons; evidently punctured only at sides and above; pubescence consisting of very fine, inconspicuous hair

of medium length, a more conspicuous, short, ventrally directed brush on epistomal margin. Eye narrowly, rather deeply emarginate; finely granulate. Antennal club large, subcircular, slightly longer than scape; not septate, with three procurved sutures indicated by rows of setae.

Pronotum about 0.93 times as long as wide; anterior margin bearing four (rarely three or five) teeth of moderate size, the median pair slightly larger, closely placed, the lateral ones separated by a distance at least equal to the basal width of one tooth; summit rather indefinite, near middle; asperate in front of summit, the asperate area closely, finely punctured; posterior and lateral areas uniformly, closely, finely granulate; pubescence consisting of abundant, rather short, fine, recumbent hair, and a few longer erect bristles.

Elytra dull, not shining; striae impressed, the punctures obscure, not impressed; interstriae two to three times as wide as striae, covered with closely placed, minute, confused granules, intermixed with a few minute, shallow punctures; each granule bearing a seta. Declivity convex, not steep. Elytral vestiture consisting of abundant, short, coarse, recumbent interstitial and striae hair; and uniserial rows of long, slender, hair-like interstitial bristles.

MALE: The posterior margin of fifth abdominal segment more broadly rounded than in female, otherwise the sexes are similar.

TYPE LOCALITY: India.

HOST: Mangifera indica (Mango).

DISTRIBUTION: Most areas of the world where Mangoes are grown. Specimens from the following localities have been examined. FLORIDA: Perrine, and Princeton. BRAZIL: Eggers' type (exact locality ?). HONDURAS: La Ceiba.

The type specimen of H. mangiferae Eggers is located in the U.S. National Museum

Taenioglyptes Bedel

Taenioglyptes Bedel, 1888, Ann. Soc. Ent. France, Hors Serie, vol. 6, p. 398; Reitter, 1894, Verh. Naturf. Vereines Brünn, vol. 33, p. 70; Hagedorn, 1910, Coleopterorum Catalogus, pars. 4, p. 40.

Cryphalus, Eichhoff, 1879, Ratio ... Tomicinorum, p. 121; Eichhoff, 1881, Europäischen Borkenkäfer, p. 172; Reitter, 1894, Verh. Naturf. Vereines Brünn, vol. 33, p. 69; Hagedorn, 1910, Coleopterorum Catalogus, pars. 4, p. 40; Hagedorn, 1910, Genera Insectorum, fasc. 111, p. 84; Hopkins, 1915, U.S. Dept. Agr., Tech. Bull. 17, p. 221; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 39;

Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 605; Chamberlin, 1918, Ore. Agr. Exp. Sta., Bull. 147, p. 13; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 87; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 340; Peyerimhoff, 1935, Bull. Soc. Ent. France, vol. 40, p. 194; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 311; Balachowsky, 1949, Faune de France 50, Coleopteres Scolytides, p. 205.

The name Taenioglyptes was proposed in 1888 by Bedel as a subgenus of Cryphalus. Since that time it has either been ignored (American writers), or used as a synonym of Cryphalus. Reitter (1894) mentioned the name Taenioglyptes as a subgenus of Cryphalus, but did not recognize a subgenus Cryphalus and included the type species, Bostrichus asperatus Gyllenhal, in the subgenus Taenioglyptes. Hagedorn (1910a) employed Reitter's usage, but transferred the type species to what he recognized as the subgenus Trypophloeus; later Hagedorn (1910b) placed Taenioglyptes as a synonym of Cryphalus.

Since 1910, this genus has been recognized as Cryphalus even though the type species had been transferred to another genus. If the law of priority is to be followed, the oldest generic or subgeneric name applying to the species remaining must be recognized; that name is

Taenioglyptes Bedel, with Bostrichus piceae Ratzeburg as the type species.

The genus Taenioglyptes is more closely allied to Cryphalus and Hypocryphalus than to other North American genera. It is readily distinguished by the following combination of characters: antennal funicle four-segmented; the club rather large, with three recurved sutures on the anterior face indicated by rows of setae; eye emarginate; pronotal summit on the basal one-third; and the third tarsal segments rather broad and emarginate.

Frons convex, pubescence scanty. Eye emarginate, finely granulate. Antennal club rather large, oval, slightly constricted at each of the three non-septate recurved sutures; funicle four-segmented.

Pronotum wider than long; basal margin and posterior one-third of lateral margin with a fine elevated line; asperate in front of summit, the summit on posterior one-third; about three to eight teeth on the anterior margin; vestiture hair-like. Fore tibiae with five to nine slender teeth on distal one-third; hind tibiae with four to seven slender teeth on distal one-fourth. The third tarsal segments broad and emarginate.

Elytral striae usually distinct, the punctures small; interstriae rather wide, with numerous, confused punctures, occasionally subgranulate; declivity rather steep, convex, without special elevations or impressions.

Vestiture consisting of short, inconspicuous, hair-like strial setae; abundant, short, semi-erect, scale-like interstitial setae; and uniserial rows of rather widely spaced, long, hair-like interstitial setae.

The sexes are similar, but easily separated by examination of the terga of the seventh and eighth abdominal segments.

TYPE SPECIES: Bostrichus piceae Ratzeburg, subsequent designation (Hopkins, 1914).

Key to the Species of Taenioglyptes

1. Elytral declivity with widely spaced, uniserial rows of interstitial hair-like bristles, each bristle at least one-half as long as distance between rows of bristles 2

Interstitial bristles on declivity inconspicuous or absent, much shorter than one-half distance between rows of bristles 3
2. Declivital bristles distinctly longer than distance between rows of bristles; B. C. to Calif.... pubescens

Declivital bristles one-half as long as distance between rows of bristles rubentis

3. Strial punctures obsolete; posterior-lateral areas of pronotum granulate fraseri

Strial punctures distinctly impressed; posterior-lateral areas of pronotum granulate-punctate 4

4. Posterior-lateral angles and base of pronotum punctate, the punctures larger and more widely separated, usually with a few granules intermixed; average body size larger; a few long declivital bristles nearly always present.....
..... ruficollis coloradensis

Posterior-lateral angles and usually the base of pronotum granulate, or at least granulate-punctate; average body size smaller; never with long declivital bristles 5

5. Posterior-lateral areas of pronotum with punctures more distinct, less granulate; striae more prominent, the punctures deeper and slightly larger; interspaces less rugose ruficollis amabilis

Posterior-lateral areas of pronotum closely granulate-punctate; striae less prominent, the punctures usually not as deep; interstriae rugose
ruficollis ruficollis

Taenioglyptes pubescens (Hopkins)
(Figs. 12, 13, 28, 36, 41, 42)

Cryphalus pubescens Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 40; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 87; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 314; Patterson and Hatch, 1945, Univ. Wash. Pub.. Biol., vol. 10, p. 152.

Cryphalus subconcentralis Hopkins, U.S. Dept. Agr., Rep. No. 99, p. 40; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 88; Chamberlin, 1917, Can. Ent., vol. 49, p. 322; Hopping, 1922, Can. Ent., vol. 54, p. 131; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 313.

This species is more closely allied to T. piceae of Europe than to other Nearctic species. It differs from other North American representatives of the genus by the very long interstitial hair-like bristles which are longer than the distance between rows of bristles; and the smoother, usually more finely punctured posterior-lateral areas of the pronotum. It differs from T. piceae by the more coarsely punctured posterior-lateral areas of the pronotum; and the presence of distinctly larger median teeth on the anterior margin of the pronotum.

FEMALE: Length 1.6-1.9 mm., 2.38 times as long as wide, body color brown.

Frons weakly convex, with a short, often indistinct, median, longitudinal elevation above the epistoma; surface coarsely, shallowly, rather closely punctured, rather coarsely reticulate over a larger area; pubescence consisting of inconspicuous, sparse, fine hair of medium length, and a more conspicuous ventrally directed epistomal brush. Eye broadly, rather deeply emarginate; finely granulate. Antennal club longer than the scape, 1.37 times as long as wide, with three recurved sutures on the anterior face marked by rows of setae.

Pronotum 0.83 times as long as wide; anterior margin rather narrowly rounded, bearing four to eight marginal teeth which decrease in size laterally; summit on basal third; asperate in front of summit, the asperities rather abundant, large usually broad, occasionally arranged in one or more subconcentric rows, particularly near summit; posterior and lateral areas coarsely, closely, deeply punctured, granulate behind summit and near the lateral margins; pubescence consisting of rather short, fine, recumbent hair, coarse on asperate area.

Elytra shining; striae not impressed, the punctures fine, shallow, distinct, separated by a distance greater than their own diameters; interstriae two to three

times as wide as the striae, the punctures fine, abundant, confused. Declivity rather steep, convex; the striae more obscure than on disc. Elytral vestiture consisting of uniserial rows of short hair-like strial setae, abundant, confused, short, interstitial scale-like setae; and uniserial rows of widely spaced, very long, slender, interstitial hair-like bristles, each bristle distinctly longer than distance between rows of bristles.

MALE: Similar to the female.

TYPE LOCALITY: Port Williams, Washington.

HOST: Abies grandis, Pinus lambertiana, Pseudotsuga taxifolia, and Sequoia sempervirens.

DISTRIBUTION: The Coastal Range from Vancouver Island, British Columbia, to San Francisco, California. Specimens from the following localities have been examined.

CALIFORNIA: Eureka, Marin Co. (Mount Tamalpais), and Muir Woods. OREGON: Astoria, Marshfield, Olympic National Forest, and Santiam National Forest. WASHINGTON: Fort Flager, and Port Williams. BRITISH COLUMBIA: Pender Harbor, and Saanichton.

The type specimens of Cryphalus pubescens and C. subconcentralis are located in the U.S. National Museum.

Taenioglyptes rubentis (Hopkins)

Cryphalus piceae, Hopkins, 1899, W. Va. Agr. Exp. Sta., Bull. 56, p. 444; Felt, 1906, Mem. N.Y. State Mus., vol. 8, p. 753; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 606.

Cryphalus rubentis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 40; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 606; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 313.

This species is somewhat intermediate between T. pubescens and T. ruficollis coloradensis, but is readily distinguished by the granulate posterior-lateral areas of the pronotum, the obsolete striae punctures, and the interstitial bristles which are very long on the elytral disc and only one-half as long as the distance between rows of bristles on the declivity. These three forms are distinguished from other North American representatives of the genus by the presence of rather long interstitial bristles on the elytral declivity (not always true in T. ruficollis coloradensis).

FEMALE: Length 1.60-1.95 mm., 2.29 times as long as wide, color light brown.

Grons convex with a weak transverse impression between the eyes and usually with a short, indistinct,

median, longitudinal elevation above the epistoma; surface coarsely, shallowly, rather closely punctured at sides, rather coarsely reticulate over a larger area; pubescence consisting of inconspicuous sparse, fine hair of medium length, and a more conspicuous ventrally directed epistomal brush. Eye broadly, rather shallowly emarginate; finely granulate. Antennal club longer than scape; about 1.40 times as long as wide; with three recurved sutures on the anterior face marked by rows of setae.

Pronotum 0.86 times as long as wide; anterior margin rather narrowly rounded, bearing from four to eight teeth, the four median ones usually subequal in size, the lateral ones reduced; summit on basal third; asperate in front of summit, the asperities rather abundant, large, usually narrow, confused; posterior and lateral areas coarsely, closely granulate, the punctures not evident; pubescence consisting of rather short, fine, recumbent hair, coarse on the asperate area.

Elytra shining; striae feebly or not at all impressed, the punctures obscure; interstitial punctures abundant, confused, very fine, surface almost smooth except for the punctures. Declivity rather steep, convex; the striae obsolete. Elytral vestiture consisting of uniserial rows of short, hair-like, striae setae; abundant, confused, short, interstitial, scale-like setae; and uniserial rows of widely spaced, long, slender, interstitial,

hair-like bristles, each bristle on the disc about as long as the distance between rows of bristles, those on the declivity about one-half as long.

MALE: Similar to the female.

TYPE LOCALITY: Pocahontas County, West Virginia.

HOST: Picea rubens.

DISTRIBUTION: Known from Pennsylvania to North Carolina. Specimens from the following localities have been examined.

NORTH CAROLINA-TENNESSEE: Great Smoky National Park (near Clingman's Dome). WEST VIRGINIA: Pocahontas County, and Randolph County. Blatchley and Leng (1916) add Pocono Lake, Pa.

The type specimen of Cryphalus rubentis is located in the U.S. National Museum.

Taenioglyptes ruficollis ruficollis (Hopkins)
(Figs. 50, 51, 52)

Cryphalus ruficollis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 40; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 314.

Cryphalus approximatus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 41; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 315; Wood, 1951, Proc. Utah Acad. Sci., vol. 26, p. 128.

Cryphalus grandis Chamberlin, 1917, Can. Ent., vol. 49, p. 323; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 315.

Cryphalus canadensis Chamberlin, 1918, in Swaine, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 88; Hopping, 1922, Can. Ent., vol. 54, p. 131; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 314.

Cryphalus mainensis Blackman, 1922, N.Y. State College of Forestry, Tech. Pub. 16, p. 126; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 314.

This widely distributed form is closely allied to T. fraseri and T. ruficollis coloradensis; it differs from T. fraseri by the distinctly impressed striae punctures, and the less granulate posterior-lateral areas of the pronotum. From T. r. coloradensis it is distinguished by the more closely punctured pronotum, with at least the posterior-lateral angles granulate, and the smaller average body size.

FEMALE: Length 1.45-1.85 mm., 2.30 times as long as wide, body color dark brown.

Frons weakly convex, with a short, often indistinct, median, longitudinal elevation near epistoma; surface coarsely reticulate over a larger area; pubescence

consisting of inconspicuous sparse, fine hair of medium length, and a more conspicuous ventrally directed epistomal brush. Eye broadly, shallowly emarginate; finely granulate. Antennal club longer than scape, about 1.17 times as long as wide, with three recurved sutures on anterior face marked by rows of setae.

Pronotum 0.84 times as long as wide; anterior margin rather broadly rounded, bearing from four to eight marginal teeth which decrease in size laterally; summit on basal third; asperate in front of summit, the asperities rather abundant, large, usually narrow, rarely arranged in one or more subconcentric rows near summit; posterior and lateral areas closely, rather finely, deeply granulate-punctate; more granulate basally, particularly in the posterior-lateral angles; pubescence consisting of rather short, fine, recumbent hair, coarse on asperate area.

Elytra shining; striae usually not impressed, the punctures distinctly impressed, rather fine, separated by a distance greater than their own diameters; interstriae two to three times as wide as striae, the punctures fine, abundant, confused. Declivity rather steep, convex, the strial and interstrial punctures obsolete. Elytral vestiture consisting of uniserial rows of short, hair-like, strial setae; abundant, confused, short, interstrial, scale-like setae; and uniserial rows of widely spaced, rather long, slender, interstrial bristles on the disc,

each bristle distinctly longer than the distance between rows of bristles.

MALE: Similar to the female, but usually the elytral scales are slightly larger.

TYPE LOCALITY: Alta, Utah.

HOSTS: Abies amabilis, A. grandis, A. lasiocarpa, A. magnifica, Picea engelmanni, P. glauca, and P. rubens.

DISTRIBUTION: Maine to British Columbia, south in the mountains to Utah and Oregon. Specimens from the following localities have been examined. IDAHO: Sand Point.

MAINE: Orono. MONTANA: Glacier National Park. NEW YORK: Cranberry Lake. UTAH: Alta, and Logan Canyon.

WASHINGTON: Metaline Falls, and Naches Ranger Station.

BRITISH COLUMBIA: Hope Mountain, London Hill Mine near Bear Lake, Nicomin Ridge, Rogers Pass, and Stanley. NEW

BRUNSWICK: Prince Edward Island. QUEBEC: Gaspé.

The type specimens of Cryphalus ruficollis, C. approximatus, and C. mainensis are located in the U.S. National Museum; that of C. canadensis is located in the Canadian National Collection; and that of C. grandis evidently has not been designated.

Taenioglyptes ruficollis, recognized at present as occurring through the northern coniferous forests from

British Columbia to New Brunswick, has evidently given rise to a distinct geographic form in each of the three mountain systems along the southern limits of its current distribution. Biological data are available only for the eastern, or Appalachian form which is recognized here as T. fraseri. Its hosts are limited to the genus Abies, while in the area of overlapping distribution the northern T. r. ruficollis is evidently limited to Picea species. The larval tunnels of the eastern T. fraseri are more or less regular and oriented to parallel the grain of the wood; in T. r. ruficollis these tunnels are irregular and not oriented with respect to the grain of the wood. These forms are also morphologically distinct and evidently do not interbreed; they are without doubt specifically distinct.

The form found in the Colorado River drainage region of the southern Rocky Mountains is morphologically more distinct from T. r. ruficollis than is T. fraseri; however, its distribution and biology have not been fully determined. Specimens collected about two hundred miles south, and others collected about three hundred miles east of the type locality of T. r. ruficollis show no evidence of intergradation. At present their ranges are not known to overlap, but it is possible that they do in central or eastern Utah. In the absence of biological data the morphological distinctness of the southern form warrants

the recognition of T. r. coloradensis as a distinct subspecies; additional knowledge of its distribution and biology may eventually prove it to be a separate species.

A gradual change in elytral and pronotal characters of T. r. ruficollis begins in Washington and Oregon and increases southward. In most specimens from western Washington and northwestern Oregon the modifications of these characters are scarcely noticeable; however, they are quite distinct in specimens from east-central California. In the absence of sufficient biological information, the complete intergradation of morphological characters suggests the recognition of a subspecies to distinguish the southern Coastal-Sierran form from the widely distributed northern form. Although the cotypes examined do not fully express the subspecific characters, the name T. r. amabilis is employed for this subspecies.

Taenioglyptes ruficollis amabilis (Chamberlin)

Cryphalus amabilis Chamberlin, 1917, Can. Ent., vol. 49, p. 321; Chamberlin, 1918, Ore. Agr. Exp. Sta., Bull. 147, p. 13; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 312; Patterson and Hatch, 1945, Univ. Wash. Pub. Biol., vol. 10, p. 152.

This subspecies intergrades completely with T. r. ruficollis, but specimens from the southern part of its

distribution may be distinguished by the more distinctly punctured posterior lateral areas of the pronotum, the more prominent striae and strial punctures, and the smoother interstriae. With these exceptions the description is the same as that of T. r. ruficollis.

TYPE LOCALITY: Elk Lake, Linn County, Oregon.

HOSTS: Abies amabilis, A. mangifica, and Pseudotsuga taxifolia.

DISTRIBUTION: Western Oregon to central California.

Specimens from the following localities have been examined.

CALIFORNIA: Devils Post Pile National Monument. OREGON:

Elk Lake, Linn County, and Santiam National Forest.

Taenioglyptes ruficollis coloradensis, new subspecies

This subspecies is closely allied to T. r. ruficollis, differing by the larger, more widely spaced punctures in the posterior-lateral areas of the pronotum, the absence of a granulate area at the posterior-lateral angles of the pronotum, and the larger average size. In most of the specimens a few interspatial bristles are present on the declivity, each about one-half as long as the distance between rows of bristles; in the only male observed these declivital bristles are regularly spaced, similar to those of T. abeitis of Europe and T. rubentis of the eastern United States.

FEMALE: Length 1.65-1.95 mm., 2.30 times as long as wide, body color dark brown.

Frons weakly convex, with a short, often indistinct, median, longitudinal elevation near the epistoma; surface coarsely reticulate over a larger area; pubescence consisting of inconspicuous, sparse, fine hair of medium length, and a more conspicuous ventrally directed epistomal brush. Eye broadly, rather deeply emarginate; finely granulate. Antennal club longer than scape, about 1.40 times as long as wide, with three recurved sutures on anterior face marked by rows of setae.

Pronotum 0.87 times as long as wide; anterior margin rather broadly rounded with three to six teeth, the median pair slightly larger; summit on basal third; asperate in front of summit, the asperities rather abundant, large, occasionally arranged in one or more sub-concentric rows, particularly near summit; posterior and lateral areas coarsely, rather closely, deeply punctured, sometimes granulate-punctate, completely granulate behind summit; pubescence consisting of rather short, fine, recumbent hair, coarse on asperate area.

Elytra shining; striae not impressed, the punctures moderately large, shallow, quite distinct, separated by a distance greater than their own diameters; interstriae about one and one-half times as wide as striae, the punctures fine, abundant, confused, the surface rugulose

on basal two thirds of disc. Declivity rather steep, convex; striae more obscure than on disc. Elytral vestiture consisting of uniserial rows of short hair-like strial setae; abundant, confused, short, interstitial scale-like setae; and uniserial rows of widely spaced, rather long, slender, interstitial, hair-like bristles, each bristle on both the disc and declivity about one-half as long as the distance between rows of bristles; the bristles on the declivity usually reduced in number, often fewer than three or four on the entire declivity.

MALE: Similar to the female. In the only recognizable male the elytral bristles are more abundant on the declivity.

TYPE LOCALITY: Seven miles north of Grand Canyon National Park, Arizona.

HOSTS: Abies concolor, A. lasiocarpa, and Pseudotsuga taxifolia.

DISTRIBUTION: Northern Arizona and southern Utah, to Colorado. The female holotype and 68 paratypes were collected Sept. 25, 1949, by S. L. Wood; the male allotype and seven paratypes from Colorado National Forest, Colorado, July 2, 1927, by M. W. Blackman; and four paratypes from Beaver, Utah, Sept. 10, 1949, by S. J. Wood.

The holotype and 12 paratypes are located in the Snow Entomological Collections; the allotype and 12 paratypes

are located in the U.S. National Museum; additional paratypes are in the collections of T. O. Thatcher and the author.

Taeioglyptes fraseri (Hopkins)

Cryphalus fraseri Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 40; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 607; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 313.

Cryphalus balsameus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 41; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 607; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 89; Dodge, 1938, Minn. Agr. Exp. Sta., Tech. Bull. 132, p. 39; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 313.

This species is closely allied to T. r. ruficollis, but differs by the obsolete striae punctures, and the more completely granulate posterior-lateral areas of the pronotum. It resembles T. rubentis, but the long interstriae bristles on the declivity are absent, the discal bristles are much shorter, and the surface of the elytra is rugulose.

FEMALE: Length 1.5-2.1 mm., 2.35 times as long as wide, body color brown.

Frons convex with a weak transverse impression between eyes and usually with a short, indistinct, median, longitudinal elevation near the epistoma; surface coarsely, shallowly, rather closely punctured at sides, rather coarsely reticulate over a larger area; pubescence consisting of inconspicuous, sparse, fine hair of medium length, and a more conspicuous ventrally directed epistomal brush. Eye broadly, rather shallowly emarginate; finely granulate. Antennal club longer than scape, about 1.42 times as long as wide, with three recurved sutures on the anterior face marked by rows of setae.

Pronotum 0.82 times as long as wide; anterior margin rather narrowly rounded, bearing from four to eight teeth, the four median ones usually subequal in size, the lateral ones reduced; summit on basal third; asperate in front of summit, the asperities rather abundant, large, usually narrow, confused; posterior and lateral areas closely, rather coarsely granulate, punctures usually evident only near asperate area; pubescence consisting of rather short, fine, recumbent hair, coarse on asperate area.

Elytra shining; striae weakly or not at all impressed, the punctures obsolete; interstriae finely, closely granulate-punctate. Declivity rather steep, convex; striae obsolete; interstriae finely punctured. Elytral

vestiture consisting of uniserial rows of short, hair-like, strial setae; abundant, confused, short, interstitial, scale-like setae; and uniserial rows of widely spaced, rather long, slender, interstitial, hair-like bristles on the disc, each bristle about one-half as long as the distance between rows of bristles, obsolete on the declivity.

MALE: Similar to the female.

TYPE LOCALITY: Pisgah Ridge, North Carolina.

HOSTS: Abies balsamea, and A. fraseri.

DISTRIBUTION: Northern Minnesota to Maine, south to North Carolina. Specimens from the following localities have been examined. MAINE: Bar Harbor, Camp Carabou, and Orono. MICHIGAN: Charlevoix County. MINNESOTA: Itasca County. NEW YORK: Cranberry Lake, Green County, and Ithaca. NORTH CAROLINA and TENNESSEE: Great Smoky National Park near Clingman's Dome, and Pisgah Ridge, N.C. PENNSYLVANIA: Pocono Lake. QUEBEC: Isle Perrot, Howick, Memphremagog, Monte Bello, and St. Anne's.

The type specimens of Cryphalus fraseri and C. balsameus are located in the U.S. National Museum.

Cryptocareenus Eggers

Cryptocareenus Eggers, 1933, Trav. Lab. d'Ent. Mus. Natl. d'Hist. Nat. (Paris), Mem. Orig. No. 1, p. 10 (nomen nudum)*; Eggers, 1937, Revista de Ent., vol. 7, p. 79; Schedl, 1939, Arb. Morph. Tax. Ent. Berlin-Dahlem, vol. 6, p. 46; Schedl, 1951, Dusenja, vol. 2, p. ? (between 71-130).

Tachyderes Blackman, 1943, Jour. Wash. Acad. Sci., vol. 33, p. 35.

The genus Cryptocareenus was described by Eggers (1933 and 1937) to include a group of Neotropical species. Blackman (1943) included two Neotropical and one additional species from southern Florida in his genus Tachyderes; however, Schedl (1951) found the two genera to be synonymous and submerged the name Tachyderes.

Blackman (1943) and Schedl (1939) placed this genus in the Pityophthorini; however, because of the pronounced sexual dimorphism, the differences between the anterior and posterior faces of the antennal club, the

* In 1933, Eggers assigned two new species to Cryptocareenus, but did not describe the genus nor designate a type species; however, in a footnote he did refer to a complete description of the genus which was to appear in another work. Prior to January 1, 1931, that footnote would have been sufficient to establish priority for the earlier date. If the current International Rules of Zoological Nomenclature are to be followed, Cryptocareenus Eggers was first used as a valid generic name in 1937; prior to that time it must be regarded as a nomen nudum.

larger more isolated pronotal asperities, the metepisternum not covered posteriorly by the elytra, and the Stephanoderes-like posterior tibiae it should be placed in the Cryphalini.

Cryptocarenum is closely allied to Stephanoderes, but differs by having the antennal club without a septum, the raised lateral line of the pronotum much longer, and the elytra subglabrous except for a few subcapitate bristles.

Female larger than male, about 1.6-2.4 mm., 2.6 times as long as wide; male smaller, about 65 per cent as large as female; body color reddish-brown.

Frons with a transverse or median impression between eyes; a series of tubercles at upper limits of impression; punctures rather coarse, pubescence inconspicuous except for the epistomal brush. Eye rather coarsely granulate; emarginate. Antennal funicle five-segmented in female, four-segmented in male; segments two to five increasing in width distally; club oval, flattened, not constricted, with three procurved sutures on both sides marked only by rows of setae.

Pronotum about 0.98 times as long as wide; basal and posterior two-thirds of lateral margin with a fine elevated line; asperate in front of summit; anterior margin armed with about eight teeth, several of these may be absent in male. Fore tibiae with serrations of outer

margin on more than distal two-thirds. Hind tibiae slender; three or four teeth on distal margin.

Elytral striae not impressed, except the first, the punctures fine, and shallow; interstriae smooth, with or without punctures; declivity convex, rather steep; vestiture scanty, consisting of minute, recumbent strial hair, and long, erect, usually subcapitate, interstitial bristles.

TYPE SPECIES: Cryptocarenum diadematus Eggers, original designation.

Key to the species of Cryptocarenum

1. Frons transversely impressed from eye to eye, with one median tubercle at upper level of eyes; elytral interspaces with numerous, extremely minute, confused punctures; second declivital interspace not strongly impressed; length 1.6-1.7 mm. porosus

Frons weakly concave between eyes, with a transverse row of five to nine tubercles at the upper level; coarsely rugose at sides of the impression; elytral interspaces smooth; second declivital interspace flat; larger 2.2-2.4 mm.; Florida floridensis

Cryptocarenum floridensis (Blackman)
(Figs. 55, 94)

Tachyderes floridensis Blackman, 1943, Jour.
Wash. Acad. Sci., vol. 33, p. 36.

The larger size, the narrower, deeper frontal impression with larger, more abundant tubercles at its upper limit, and the more coarsely sculptured frons distinguish this species from C. porosus.

FEMALE: Length 2.2-2.4 mm., 2.65 times as long as wide, body color reddish-brown.

Frons concavely impressed, width of impression equal to about one-half distance between eyes; surface rather coarsely punctured, coarsely rugose at sides; a row of about five to nine prominent tubercles along upper limits of impression, the median one larger; pubescence consisting of fine, short, inconspicuous hair, more abundant and forming a ventrally directed brush along epistoma. Eye large, emarginate; very coarsely granulate. Antennal club about as long as scape, 1.20 times as long as wide; the sutures rather strongly procurved, indicated by rows of setae.

Pronotum about 0.98 times as long as wide; anterior margin with about seven or eight, large, subcontiguous teeth; summit at middle; asperate in front of summit, with rugosities from the asperate area continuing

posteriorly, those near the lateral margin reaching the base; posterior and lateral areas shining, finely, shallowly, sparsely punctured; pubescence consisting of inconspicuous, fine, short, sparse hair, slightly longer in asperate area.

Elytra shining, subglabrous; only the first striae impressed, the punctures fine, very shallow, separated by a distance greater than their own diameters (variable); interstriae about twice as wide as striae, impunctate. Declivity moderately steep, convex; striae one and two impressed; interspace two impressed, narrower apically. Elytra subglabrous on disc; minute strial hairs, and longer, sparse, subcapitate interstitial bristles more conspicuous on declivity and sides.

MALE: Similar to the female except: length 1.5-1.6 mm., 2.5 times as long as wide; eye reduced in size, about two-thirds as large as in female; funicle four-segmented, one or more of teeth may be absent from anterior margin of pronotum; striae and strial punctures obscure; and declivity not as steep. Because of similar color and size it could easily be confused with female of C. porosus.

TYPE LOCALITY: Paradise Key, Florida.

HOSTS: Chenopodium ambrosioides, Coccolobis laurifolia, Conocarpus erecta, Dipholis salicifolia, Ficus aurea,

Galactea spiciformis, Ipomoea pres-caprae, Metopium toxiferum, Ocotea catesbyana, Persea borbonia, Pithecellobium unguis-cati, P. guadelupense, Rhizophora mangle, Rhus radicans, Torrubia longifolia, and Vitis spp.

DISTRIBUTION: Southern Florida, from Sebring to Key West; southern Texas to Tampico, Mexico; the Virgin Islands, and Hati. Specimens from the following localities have been examined. FLORIDA: Everglades National Park, Grassy Key, Key Largo, Maticumba Key, Ochoppee, Paradise Key, Plantation Key, Royal Palm Hammock State Park, and Sugar Loaf Key.

The type specimen of Tachyderes floridensis is located in the U.S. National Museum.

Cryptocarenus porosus, new species
(Figs. 16, 17, 30, 38, 54, 93)

The small body size; the transversely impressed (not concave) frons with only one median frontal tubercle; the smaller, more finely granulate eye; and the presence of numerous, extremely minute, confused, interstitial punctures distinguish this species from C. floridensis. It is closely allied to C. heveae (from Africa), but C. heveae has the interstitial punctures of the elytra slightly larger, and marginal teeth of pronotum narrower and distinctly separate.

FEMALE: Length 1.6-1.7 mm., 2.62 times as long as wide, body color dark reddish-brown.

Frons strongly, transversely impressed between eyes; surface very coarsely punctured, particularly above and at sides; a large, median tubercle with a subcarinate dorsal extension at upper level of eyes; pubescence consisting of fine, short, inconspicuous hair, more abundant and forming a ventrally directed brush along epistoma. Eye emarginate; not coarsely granulate. Antennal club about as long as scape, 1.04 times as long as wide; the sutures rather strongly procurved, indicated by rows of setae.

Pronotum about 0.98 times as long as wide; anterior margin with about seven or eight, large, subcontiguous teeth; summit at middle; asperate in front of summit; posterior and lateral areas shining, finely, shallowly, sparsely punctured; pubescence consisting of inconspicuous, fine, short, sparse hair, slightly longer in asperate area.

Elytra shining, subglabrous; only the first striae impressed, the punctures fine, shallow, separated by a distance greater than their own diameters; interstriae about twice as wide as striae, the punctures extremely minute, very abundant, confused. Declivity moderately steep, convex; striae one and two impressed; interspace two not as strongly impressed or as narrow as

in C. floridensis. Elytra subglabrous on disc, with the minute strial hairs; longer, sparse, subcapitate inter-strial bristles, more conspicuous on declivity and sides.

MALE: Similar to the female except: length 1.0 mm., about 2.5 times as long as wide; eye reduced, about two-thirds as large as in female; funicle four-segmented; several teeth may be absent from anterior margin of pronotum; striae and strial punctures obscure; declivity not as steep.

TYPE LOCALITY: Royal Palm Hammock State Park, Florida.

HOST: Vitis sp.

DISTRIBUTION: The female holotype and one female paratype were collected June 22; the male allotype, one female paratype, and two additional damaged females were collected at the Everglades National Park, July 6; all were collected in 1951 by R. D. Price, R. H. and L. D. Beamer, and S. L. Wood.

The holotype and allotype are in the Snow Entomological Collections; the paratypes are in the collection of the author.

Stephanoderes Eichhoff

Stephanoderes Eichhoff, 1871, Berlin Ent. Zeitschr., vol. 15, p. 132; Eichhoff, 1879, Ratio ... Tomicinorum,

p. 142; Eichhoff, 1881, Europäischen Borkenkäfer, pp. 46, 190; Eichhoff, 1883, Rev. d'Ent., vol. 5, pp. 110, 134; Eichhoff and Schwarz, 1896, Proc. U.S. Nat. Mus., vol. 18, p. 608; Swaine, 1909, N.Y. State Mus., Bull. 134, p. 116; Hagedorn, 1910, Coleopterorum Catalogus, pars. 4, p. 40; Hagedorn, 1910, Genera Insectorum, fasc. 111, p. 84; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 21; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 599; Swaine, 1918, Dom. Can. Dept. Agr., Tech. Bull. 14, p. 45; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 340; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 89; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 303; Schedl, 1940, An. Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 342; Blackwelder, 1947, U.S. Nat. Mus., Bull. 185, p. 777.

The genus Stephanoderes was described by Eichhoff (1871) to include seven species. Later he (in Eichhoff and Schwarz, 1896) regarded Stephanoderes and Hypothenemus as synonymous and submerged the name Hypothenemus since it was established on the basis of a non-existent three-segmented antennal funicle (although it may be three segmented in some males of Hypothenemus). Reitter (1894) and Hagedorn (1910a) included Stephanoderes as a subgenus of Cryphalus; Swaine (1909) used it as a subgenus of Hypothenemus. In 1914, Hopkins designated S. chapuisii as the type species

and in 1915, established Stephanoderes as a valid genus.

A thorough study of all known species of Hypothenemus and Stephanoderes, particularly those from the tropics, would probably result in the reduction in rank of Stephanoderes to that of a subgenus or a possible synonym of Hypothenemus. For example, they (including tropical species) intergrade with respect to body size, body form and proportion, type of vestiture, arrangement and size of pronotal asperities, tibial armature, and characters of the frons, eye, antennal club, etc. The only character thought to be reliable, the five-segmented antennal funicle in Stephanoderes (four-segmented in Hypothenemus), in S. castaneus has from three to five segments (some segments usually partly fused to others). However, at present both generic names are retained, because in the North American fauna they designate two distinct, rather easily separated groups of species.

The genus Stephanoderes may be distinguished from allied genera as follows: the antennal funicle five-segmented; the antennal club constricted at the partly septate first suture; the fore tibiae with teeth on only the distal one-fourth, and the elytra usually coarsely striate. The smaller North American Stephanoderes can also be readily distinguished from Hypothenemus by the presence of a single row of short hair-like setae (arising from the striae punctures) between the rows of scale-like

bristles. The Hypothenemus, and the S. dissimilis and S. obesus groups, have abundant, short, interstitial setae in addition to the rows of bristles.

Female larger than the male, length 1.1-2.4 mm., 2.3-2.5 times as long as wide; male smaller, about three-fourths as large as female, 2.0-2.2 times as long as wide; body color light brown to black; vestiture consisting of hair-like and scale-like setae.

Frons broad, convex, often with a median groove or elevation, rarely with a transverse elevation; punctures and pubescence usually not prominent. Eye sinuate to shallowly emarginate; finely granulate, its size reduced in male to as little as one-third that of female. Antennal funicle five-segmented in female, usually four-segmented in male, the segments increasing in width distally; club elongate, smaller and narrower in male than in female; flattened, with three sutures on both sides, the first partly septate, the second and third marked only by setae.

Pronotum 0.8-1.0 times as long as wide, the length never exceeding the width; basal margin and posterior one-third of lateral margin with a fine, elevated line; asperate in front of summit; anterior margin armed with two to six teeth (part or all of these may be absent in the male). Fore tibiae with five teeth (rarely four to six) on distal one-fourth. Hind tibia slender; four teeth on distal margin.

Elytral striae usually distinctly impressed, with rather coarse, close, deep punctures; interstriae usually almost smooth, with a fine puncture at the base of each seta; declivity usually steep, convex, without special prominences or impressions; vestiture consisting of rows of erect, rather long, interstitial bristles, and short, recumbent strial or interstitial setae.

TYPE SPECIES: (Stephanoderes chapuisii Eichhoff=)

Hypothenemus dissimilis Zimmermann, subsequent designation (Hopkins, 1914)

Key to the Species of Stephanoderes

1. Pronotum with about 8-25 asperities on anterior slope, and with two to four teeth on anterior margin; elytra (at least on declivity) with uniserial rows of long, erect, interstitial bristles, and abundant, short, recumbent, strial and interstitial setae; frons convex, without a median impression or elevation, or with a prominent transverse carina and a distinct impression below this carina; larger species, the females 1.5-2.4 mm. (some brunneus 1.35 mm.) 2

Pronotum more slender, with asperities more abundant and smaller (more than 25), and with at least four teeth on anterior margin (rarely two or three in sparsus); elytra with uniserial rows of

- erect interstitial bristles and minute, inconspicuous, strial setae, one arising from each puncture; frons usually with a median longitudinal impression or elevation; smaller species, females 1.1-1.6 mm. (rarely 1.7 mm.) 8
2. Frons uniformly convex; anterior pronotal margin with two to four subcontiguous teeth, the lateral ones, when present, distinctly smaller; elytral striae with punctures impressed 3
- Frons with a transverse carina at upper level of eyes, flattened or slightly concave below this point; anterior margin of pronotum with two widely separated teeth, or with four teeth, the median pair distinctly smaller; elytral striae with punctures obscure, particularly on declivity 7
3. Elytral interspaces on declivity with short, semi-recumbent, scale- or hair-like setae, and rows of long, slender, erect, hair-like setae; base of pronotum never with scale-like pubescence; anterior pronotal margin with two teeth 4
- Elytra with numerous, short, recumbent, hair-like setae and uniserial rows of long, erect, broad, interstitial scales; pronotum with scale-like setae

- on basal third; anterior pronotal margin with two to four teeth 5
4. Elytral declivity flattened, with third interspace slightly elevated and strial punctures as large as on disc; discal interspaces and striae about equal in width; declivital pubescence consisting of abundant, long, coarse, pointed bristles intermixed with shorter, similar bristles; posterior area of pronotum rather coarsely punctured, subaciculate behind summit hirsutus
- Elytral declivity convex, with strial punctures small; discal interspaces at least one and one-half times as wide as striae; declivital pubescence consisting of abundant, short, semirecumbent scales, and less abundant, long, slender, erect hair; granulate behind summit dissimilis
5. Interspatial scales of declivity about three-fourths as long as distance between rows of scales; anterior pronotal margin with two teeth; about 8-12 coarse asperities between anterior margin and summit of pronotum rotundicollis
- Interstitial scales on declivity as long as distance between rows of scales; anterior margin of pronotum with four teeth (the lateral pair much smaller); at

least 15 coarse asperities between anterior margin
and summit of pronotum 6

6. Declivital scales narrower, more than four times as
long as wide; size larger than 1.8 mm.; antennal
funicle five-segmented in female; southern Texas
..... erectus

Declivital scales broad, two to three times as long
as wide; smaller than 1.8 mm.; antennal funicle
usually three-segmented in female; southern Florida
..... castaneus

7. Lateral areas of pronotum shallowly, densely
punctured; anterior margin of pronotum with four
teeth, the median pair smaller; interstitial
bristles narrow, not increasing in width distally;
transverse frontal carina less sharply elevated,
impression below this carina deeper and narrower,
occupying about one-half the distance between eyes;
larger than 1.55 mm. obesus

Pronotum indistinctly punctured laterally, sub-
granulate behind summit; anterior margin with two
widely separated teeth, rarely one or two smaller
teeth between them; interstitial bristles more
distinctly flattened, increasing in width distally;
transverse frontal carina more sharply elevated, the

impression broad, occupying at least three-fourths of the distance between eyes; frons more coarsely punctured; smaller than 1.5 mm. brunneus

8. Declivital bristles narrow, at least four times as long as wide (three times in some squamosus); frons usually with a median impression, never with a median elevation; anterior margin of pronotum with four teeth of equal size, rarely with one or two additional granules 9

Declivital bristles broad, less than three times as long as wide; frons either with a median impression or elevation or both (not always prominent); anterior margin of pronotum normally with six or more teeth (only four in niger and sparsus) 12

9. Setae along costal margin of elytra hair-like, at least anteriorly; declivital bristles much narrower, at least five times as long as wide 10

Setae along costal margin of elytra scale-like; declivital bristles rather broad, about four times as long as wide 11

10. Declivital bristles narrower, frequently almost hair-like laterally on or near the ninth interspace;

setae along entire costal margin of elytra hair-like; the median frontal impression usually very short, often a single puncture interstitialis

Declivital bristles rather wide, longer but never hair-like laterally; setae along costal margin of elytra hair-like only on anterior half; frontal impression a narrow groove, beginning at upper level of eyes and usually extending about one-half the distance to epistomal margin; usually smaller, 1.25-1.55 mm. nitidipennis

11. Declivity convex, without a lateral elevation; elytral interspaces almost smooth, bristles narrower; frontal groove narrow, extending from upper level of eyes about three-fourths of the distance to epistomal margin; an exotic species occasionally found in imported Brazil nuts
..... rufescens

Declivity somewhat flattened, laterally margined by a subcarinate elevation extending from junction of interspaces five and seven to junction of interspaces one and nine; elytral surface rugose; interspatial scales rather broad; frontal groove usually short and rather inconspicuous; southern Florida to Cuba ..
..... squamosus

12. Anterior margin of pronotum normally with four teeth, the median pair slightly larger; bristles on ninth interspace at base of declivity long, slender, and pointed, at least five times as long as wide; declivital striae impressed, the interspaces slightly raised and coarsely granulate; southern Texas niger

Pronotal margin normally with six teeth (except sparsus); ninth interspacial bristles at base of declivity rather broad and scale-like; declivital striae less strongly impressed, interspaces and granules not as large 13

13. Length less than 1.3 mm.; pronotal margin with four teeth (often fewer); lateral areas of pronotum usually with a small granule at base of each scale; elytral interspaces uniserially, coarsely granulate; each elytral scale shorter than distance between rows of scales, about one and one-half times as long as wide; southern Texas sparsus

Length greater than 1.4 mm.; anterior margin of pronotum normally with six or more teeth; elytral interspaces with granules indistinct or absent; lateral areas of pronotum shallowly punctured ... 14

14. Frons distinctly, subtuberculately elevated medially at upper level of eyes, a narrow groove extending from summit of elevation about one-fourth to three-fourths of the distance to the epistoma, slightly concave longitudinally between summit of elevation and epistomal margin; teeth on anterior margin of pronotum subequal in size; declivital bristles two to three times as long as wide obscurus

Frons convex, at least not longitudinally concave on lower half, without a median tuberculate elevation; either lateral teeth on anterior margin of pronotum reduced in size, or more widely spaced; declivital bristles usually shorter, less than two times as long as wide 15

15. Frons with coarse, close, deep punctures; marginal teeth of pronotum subequal in size, widely spaced, separated by width of one tooth or more
 andersoni

Frons coarsely reticulate, with inconspicuous, rather small, sparse, shallow punctures; lateral pair of teeth on pronotal margin smaller 16

16. Pronotum more finely punctured, the punctures not granulate behind summit; interstitial punctures not granulate on disc; stouter, usually larger

liquidambarae

Pronotum granulate behind summit; interstitial punctures subgranulate; more slender, usually smaller

georgiae Hopkins

Stephanoderes hirsutus, new species
(Figs. 56, 95)

This species is closely allied to S. dissimilis, but differs as follows: elytral declivity distinctly flattened; third declivital interspace slightly elevated; declivital bristles longer, coarser, and more abundant; striae larger and deeper; interstitial punctures usually larger and less abundant; and the posterior areas of the pronotum more coarsely punctured and subaciculate. The male distinguished from the male of S. dissimilis by the absence of short, scale-like setae on the declivity, coarser more abundant declivital bristles, and more strongly impressed first and second declivital striae. The absence of scale-like setae on the pronotum, and the presence of interspatial rows of pointed, hair-like setae on the elytra distinguish S. hirsutus and S. dissimilis from other North American representatives of the genus.

FEMALE: Length 1.7-1.9 mm., 2.32 times as long as wide, body color black, antennae and legs testaceous.

Frons evenly convex, finely aciculate; punctures of moderate size, depth and density. Eye emarginate; finely granulate. Antennal club longer than scape, about 1.36 times as long as wide; the first suture slightly procurved, the second and third bisinuate.

Pronotum about 0.85 times as long as wide, with two rather large contiguous teeth on anterior margin, and about 8 to 14 large asperities between summit and anterior margin; summit rather high, located behind middle; posterior and lateral areas with coarse, close, deep punctures, becoming subaciculate behind summit; pubescence consisting of rather long, moderately abundant hair.

Elytra shining; striae slightly impressed, about as wide as interstriae; striae punctures close, separated by less than one-half their own diameters; interstitial punctures in irregular rows, about one-third as large as the striae punctures and separated by one to four times their own diameters. Declivity rather steep, appearing flattened because of the slightly impressed second interspace and the slightly elevated third interspace; the posterior portion of interspaces five and nine usually elevated, although this is not consistent. Elytral vestiture on disc consisting of rows of erect, pointed interspatial bristles, each bristle shorter than the

distance between rows of bristles; and of short inconspicuous, recumbent strial hair; the interstrial bristles on declivity sharply pointed, considerably more abundant and longer than on disc, the longest may be at least twice as long as the distance between the irregular rows of bristles; the strial hair more nearly erect, and slightly longer than on disc.

MALE: Similar to the female except: length 1.3-1.5 mm., 2.0 times as long as wide; the eye reduced in size, about one-half as large as in female; antennal club more slender; antennal funicle usually four-segmented; summit of pronotum slightly higher; asperities narrower; anterior margin of pronotum usually without teeth, although one or two teeth may be present; elytral striae and punctures less distinct, the second declivital interspace not as strongly impressed; and elytral vestiture somewhat longer on sides and disc.

TYPE LOCALITY: Plantation Key, Florida.

HOSTS: Achras sapota, Ardisia paniculata, Eugenia buxifolia, Ipomoea cathartica, Lysiloma bahamensis, Metopium toxiferum, Pithecellobium guadelupense, P. unguis-cati, and Reynosa septentrionalis.

DISTRIBUTION: The Florida Keys from Key Largo south to Key West. The female holotype, male allotype, and 24 paratypes

were collected June 26. In addition 53 paratypes were collected as follows: Grassy Key, June 27; Key Largo, June 25; Key Vaca, June 29; Matacumba Key, June 28; Sugar Loaf Key, July 3 (all collected in 1951 by R. D. Price, R. H. and L. D. Beamer, and S. L. Wood); Big Pine, March 6, by Barber; Marathon (Key Vaca), March 7-8; and Key West, April 6, 1903, by E. A. Schwarz.

The holotype, allotype and 10 paratypes are located in the Snow Entomological Collections; additional paratypes are in the Collections of the U.S. National Museum, the Canadian National Museum, and that of the author.

Stephanodereis dissimilis (Zimmermann)
(Figs. 1, 2, 3, 4, 22, 23, 24, 31, 39, 57, 96)

Crypturgus dissimilis Zimmermann, 1868, Trans. Amer. Ent. Soc., vol. 2, p. 144; Eichhoff, 1879, Ratio ... Tomicinorum, p. 144.

Hypothenemus dissimilis, Leconte, 1876, Proc. Amer. Phil. Soc., vol. 15, p. 356; Schwarz, 1878, Proc. Amer. Phil. Soc., vol. 17, p. 468; Schwarz, 1888, Proc. Ent. Soc. Wash., vol. 1, p. 80; Smith, 1890, Ent. Amer., vol. 6, p. 54; Smith, 1890, Cat. Ins. N. J., p. 267; Chittenden, 1893, Proc. Ent. Soc. Wash., vol. 2, p. 393; Hopkins, 1893, W. Va. Agr. Exp. Sta., Bull. 31, p. 133; Hopkins, 1893, W. Va. Agr. Exp. Sta., Bull. 32, p. 210; Hamilton, 1895, Trans. Amer. Ent. Soc., vol. 22, pp. 346, 378; Chittenden,

1895, *Ins. Life*, vol. 7, p. 385; Lintner, 1896, N.Y. Report 11, p. 270; Wenzel, 1905, *Ent. News*, vol. 16, p. 124.

Stephanoderes dissimilis, Smith, 1900, *Cat. Ins. N. J.*, p. 362; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 24; Blatchley and Leng, 1916, *Rhynchophora of North Eastern America*, p. 603; Swaine, 1918, *Dom. Can. Dept. Agr., Tech. Bull.* 14, pl. 9, fig. 43; Blackman, 1922, *Miss. Agr. Exp. Sta., Tech. Bull.* 11, p. 89; Dodge, 1938, *Minn. Agr. Exp. Sta., Tech. Bull.* 132, p. 39; Chamberlin, 1939, *The Bark and Timber Beetles of North America North of Mexico*, p. 304.

Stephanoderes chapuisii Eichhoff, 1871, *Berlin Ent. Zeitschr.*, p. 132; Leconte, 1876, *Proc. Amer. Phil. Soc.*, vol. 15, p. 356; Eichhoff, 1879, *Ratio ... Tomicinorum*, p. 143; Eichhoff and Schwarz, 1896, *Proc. U.S. Nat. Mus.*, vol. 18, pp. 608, 610; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 24; Blatchley and Leng, 1916, *Rhynchophora of North Eastern America*, p. 604; Blackman, 1922, *Miss. Agr. Exp. Sta., Tech. Bull.* 11, p. 90; Chamberlin, 1939, *The Bark and Timber Beetles of North America North of Mexico*, p. 305.

This species is closely allied to S. hirsutus from which the female differs as follows: uniformly convex declivity; declivital pubescence of very short scales and sparse rows of long, slender, interstitial hair; strial

punctures smaller and less deeply impressed; interstitial punctures usually smaller, more abundant and confused; and the area behind the summit more granulate. The male is distinguished from the male of S. hirsutus by: a more convex declivity; presence of rather abundant, short, scale-like setae on the declivity; more slender, less abundant, declivital bristles; and the weakly impressed first and second declivital striae. The absence of scale-like setae on the pronotum and the presence of interspatial rows of pointed, hair-like setae on the elytra of both sexes distinguish S. dissimilis and S. hirsutus from other North American Stephanoderes.

FEMALE: Length 1.6-2.4 mm., 2.30 times as long as wide, body color black, antennae and legs usually testaceous.

Frons evenly convex above, more nearly flattened below, finely aciculate; punctures of moderate size, depth, and density. Eye emarginate; finely granulate. Antennal club longer than scape, about 1.37 times as long as wide; the first suture procurved, the second and third bisinuate.

Pronotum about 0.85 times as long as wide; two rather large contiguous teeth on anterior margin, and about 10 to 16 large, distinct asperities between summit and anterior margin; summit rather high, located behind middle; posterior and lateral areas with coarse, close, deep punctures, becoming granulate-punctate behind summit.

Pubescence consisting of moderately abundant hair of medium length.

Elytra shining; striae slightly impressed, interstriae usually about one and one-half times as wide as striae (variable); strial punctures smaller, and interstitial punctures usually smaller, more abundant and more confused than in S. hirsuta. Declivity steep, convex; striae more strongly impressed than on disc, the punctures usually less distinct; interspaces two, three and nine more convex than the others. Elytral vestiture consisting of sparse rows of long, pointed, interstitial bristles, each shorter than the distance between rows of bristles; and short, abundant, scale-like, interspacial setae; minute strial hair may be visible. Declivital vestiture more abundant and more prominent; the disc often glabrous as a result of wear.

MALE: Similar to the female except: length 1.3-1.5 mm., 2.0 times as long as wide; eye reduced in size, about one-half as large as in female; antennal club more slender; funicle usually four-segmented; summit of pronotum higher; asperities narrower; anterior margin of pronotum usually without teeth, although one or two teeth may be present; elytral striae and strial punctures less distinct; and elytral vestiture somewhat longer.

TYPE LOCALITY: North Carolina.

HOSTS: Acer rubrum, Carya spp., Cercis canadensis, Fagus grandifolia caroliniana, Ficus sp., Kalmia latifolia, Quercus spp., Ocotea catesbyana, Prunus sp., Pyrus sp., Rhamnus lanceolata, Sassafras albidum, and Vitis spp.

DISTRIBUTION: The United States south of the Great Lakes and east of a line connecting southern Minnesota with the lower Rio Grande Valley of Texas, except in Florida south of Lake Okeechobee. Specimens from the following localities have been examined. ALABAMA: Mobile. CONNECTICUT: Branford, Hartford, and New Haven. DISTRICT OF COLUMBIA: Washington. FLORIDA: Biscayne Bay, Dade City, Dunedin, Gainesville, Greenville, Jacksonville, La Belle, Monticello, Oleno State Park, Sanford, Sebring, Seminole, Snead, and Suwannee Springs. GEORGIA: Brunswick. ILLINOIS: Lawrenceville. KENTUCKY: Williamsburg. LOUISIANA: Covington. MARYLAND: College Park. MINNESOTA: Olmsted County. MISSISSIPPI: Lucedale, and Nicholson. MISSOURI: Warrensburg. NEW JERSEY: Medford, Phillipsburg, and Prospertown. NEW YORK: Yaphank. NORTH CAROLINA: Abendeen, Cherokee, Marston, Monroe, Southern Pines, and Tryon. OHIO: Columbus, Franklin County, and Hocking County. PENNSYLVANIA: Allegheny, Chambersburg, Easton, Jeanette, Mount Alto, Philadelphia, Pittsburg, and Wind Gap. SOUTH CAROLINA: Awendaw, Edisto

Island, and Myrtle Beach. TENNESSEE: Gatlinburg. TEXAS: Columbus, Hidalgo County, Lexington, and College Station.

The type specimen of S. dissimilis is located in the Museum of Comparative Zoology.

Stephanoderes rotundicollis Eichhoff
(Figs. 58, 97)

Stephanoderes rotundicollis Eichhoff, 1879, Ratio ... Tomicinorum, p. 145; Eichhoff and Schwarz, 1896, Proc. U.S. Nat. Mus., vol. 18, p. 608; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 24; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 602; Blackman, 1922, Miss. Agr. Exp. Sta., Bull. 11, p. 91; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 306.

Stephanoderes sculpturatus Eichhoff, 1879, Ratio ... Tomicinorum, p. 146; Hopkins, 1893, W. Va. Agr. Exp. Sta., Bull. 31, p. 133; Lintner, 1896, N.Y. Rep. 11, p. 270; Eichhoff and Schwarz, 1896, Proc. U.S. Nat. Mus., vol. 18, p. 608; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 24; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 603; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 310.

Hypothenemus erectus, Smith, 1890, Ent. Amer., vol. 6, p. 54; Smith, 1890, Cat. Ins. N.J., p. 267; Hopkins, 1893, W. Va. Agr. Exp. Sta., Bull. 31, p. 133; Lintner,

1896, N.Y. Rep. 11, p. 270; Smith, 1900, Cat. Ins. N.J., p. 362; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 602.

Stephanoderes quercus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 32; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 602; Blackman, 1922, Miss. Agr. Exp. Sta., Bull. 11, p. 91; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 306.

The presence of only two teeth on the anterior margin of the pronotum, only 8 to 12 asperities on the pronotum between the summit and the anterior margin, and shorter interspacial scales on the elytral declivity distinguish this species from the closely allied S. erectus and S. castaneus. It is much smaller than S. erectus, and has the pronotum more deeply punctured on the lateral areas than S. castaneus. The male is distinguished from the male of S. castaneus by a higher summit on the pronotum, and stouter body form; and from S. erectus by smaller size, and more distinct striae punctures. These three species are similar in having very short, abundant, interstriae hair- or scale-like setae; rows of long, erect, interspacial bristles flattened and scale-like; a small number (8 to 25) of coarse pronotal asperities, and the presence of scale-like setae on the posterior half of the pronotum.

FEMALE: Length 1.6-1.8 mm., 2.33 times as long as wide; body color black, the antennae and legs may be testaceous.

Frons evenly convex, rarely with a small impression; surface very finely aciculate, the punctures of moderate size, depth and density. Eye emarginate; finely granulate. Antennal club longer than scape, 1.35 times as long as wide; the first suture slightly procurved, the second and third weakly bisinuate.

Pronotum 0.82 times as long as wide, with two rather large contiguous teeth on anterior margin, and about 8 to 12 large, distinct asperities between summit and anterior margin; summit rather high, higher than S. erectus or S. castaneus, located behind middle; posterior and lateral areas with rather close, small, shallow punctures, usually becoming subgranulate behind summit. Pubescence consisting of rather short, semi-erect, moderately abundant, hair-like setae, becoming intermixed on posterior half with sparse, erect, equally long scale-like setae.

Elytra shining; striae very slightly impressed, punctures small, strongly impressed, separated by about three-fourths of their own diameters; interstriae about one and one-half times as wide as striae, punctures minute, abundant and confused. Declivity rather steep, convex. Elytral vestiture consisting of rather abundant, short, recumbent, scale- or hair-like, interstitial setae; and

uniserial rows of erect, long, blunt, scale-like bristles, each bristle about three to four times as long as wide, about three-fourths as long on declivity as distance between rows of bristles, somewhat shorter on disc; the disc often glabrous as a result of wear.

MALE: Similar to the female except: length 1.3-1.4 mm., 2.0 times as long as wide; eye reduced in size, about one-half as large as in female; antennal club more slender; antennal funicle usually four-segmented; summit of pronotum higher, the asperities narrower; anterior margin of pronotum usually without teeth, although one or two teeth may be present, never more than two; elytral striae and punctures less distinct; and elytral vestiture somewhat longer, particularly on the sides.

TYPE LOCALITY: North America (exact locality not known).

HOSTS: Carya spp., Cercis canadensis, Fagus grandifolia caroliniana, Fraxinus sp., Quercus spp., and Rhamnus lanceolata.

DISTRIBUTION: The United States south and east of a line from Philadelphia, Pennsylvania, through Lawrence, Kansas, to Hidalgo County, Texas, except in Florida south of Snead. Specimens from the following localities have been examined. ARKANSAS: Hot Springs. FLORIDA: Snead. GEORGIA:

Barnsville. KANSAS: Kiowa, and Lawrence. MARYLAND: labeled only "Md." MISSISSIPPI: Trimcane Swamp. MISSOURI: Iron Mountain, and Warrensburg. NEW YORK: Peekskill. NORTH CAROLINA: Monroe, Southern Pines, and Tryon. PENNSYLVANIA: Angora, and Frankford. TENNESSEE: Gatlinburg. TEXAS: Brownsville, Columbus, Dallas, Davis Mountains, Devils River, Hidalgo County, Lexington, Macdona, San Diego, Southmost, and Victoria. WEST VIRGINIA: Berkeley, Dellslow, and Doddridge.

The type specimen of S. quercus is located in the U.S. National Museum; those of S. rotundicollis and S. sculpturatus evidently are lost.

Stephanoderes erectus (Leconte)
(Figs. 59, 98)

Hypothenemus erectus Leconte, 1876, Proc. Amer. Phil. Soc., vol. 15, p. 356.

Stephanoderes erectus, Eichhoff and Schwarz, 1896, Proc. U.S. Nat. Mus., vol. 18, p. 608; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 24; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 310; Schedl, 1939, An. Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 342.

Stephanoderes brunneicollis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 33; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 310.

A large species allied to S. rotundicollis and S. castaneus. From S. rotundicollis it may be distinguished by larger size; longer interstitial bristles on the declivity; smaller strial punctures; wider interspaces; more abundant pronotal asperities; and presence of four teeth on the anterior margin of the pronotum. It is separated from S. castaneus by: larger size; more narrow interspatial bristles on the declivity; more numerous punctures on the lateral areas of the pronotum; and less abundant, larger, pronotal asperities. These three species are similar in having very short, abundant, interstitial, hair- or scale-like setae; rows of long interspatial bristles, each bristle flattened and scale-like; a small number (8 to 25) of coarse pronotal asperities; and scale-like setae present on the posterior half of the pronotum.

FEMALE: Length 1.8-2.0 mm., 2.36 times as long as wide; body color black, the antennae and legs may be testaceous.

Frons convex above, somewhat flattened below, very finely aciculate, with small, shallow punctures of moderate abundance. Eye emarginate; finely granulate. Antennal club longer than scape, 1.54 times as long as wide; the first suture slightly procurved, the second and third bisinuate.

Pronotum 0.82 times as long as wide; four contiguous teeth on anterior margin, the median pair much

larger; about 15 to 20 large, distinct asperities between summit and anterior margin; summit not as high as in S. rotundicollis, located at middle; posterior and lateral areas with rather close, small, shallow punctures, usually becoming subgranulate behind summit. Pubescence consisting of rather short, semi-recumbent, moderately abundant, hair-like setae, intermixed on posterior half with sparse, blunt, equally long (or longer), scale-like setae.

Elytra shining; striae distinctly impressed, the punctures small, separated by slightly less than their own diameters; interstriae about two and one-half times as wide as striae, the punctures small, abundant and confused. Declivity not as steep as in S. rotundicollis or S. castaneus, convex. Elytral vestiture consisting of rather abundant, short, scale- or hair-like, interspatial setae; and uniserial rows of long, blunt, scale-like bristles, each bristle on the declivity about four to six times as long as wide, and about as long as the distance between rows of bristles, becoming shorter on the disc; the disc often glabrous as a result of wear.

MALE: Similar to the female except: length 1.5-1.7 mm., 2.0 times as long as wide; eye reduced in size about one-half as large as in female; antennal club more slender; funicle usually four-segmented; summit of pronotum higher, the asperities narrower; anterior margin of pronotum

usually with four teeth as in female, although the lateral pair may be absent; elytral striae and punctures less distinct; and elytral vestiture somewhat longer, particularly on the sides.

TYPE LOCALITY: Round Mountain, Texas.

HOSTS: Acacia sp., Celtis laevigata, Ficus sp., and Prosopis sp.

DISTRIBUTION: Southern Texas. Specimens from the following localities have been examined. TEXAS: Brownsville, Corpus Christi, Davis Mountains, Hidalgo County, Montell, Round Mountain, San Diego, Southmost, and Victoria.

The type specimen of Hypothenemus erectus is located in the Museum of Comparative Zoology; that of S. brunneicollis is in the U.S. National Museum.

Stephanoderes castaneus, new species
(Figs. 21, 60, 99)

The more numerous, somewhat smaller pronotal asperities; the rougher, less distinctly punctured posterior-lateral areas of the pronotum; and the lighter body color distinguish this species from its nearest allies, S. rotundicollis and S. erectus. The female also differs from S. rotundicollis by the presence of four teeth on the anterior margin of the pronotum; and from S. erectus by the smaller size, and narrower bristles on the declivity.

The male is similar to the female, but is also distinguished from the male of S. rotundicollis by: the summit of pronotum not as high; and the more slender body form. These three species are similar in having very short abundant interstitial hair- or scale-like setae; rows of long interspatial bristles flattened and scale-like; a small number (8 to 25) of coarse pronotal asperities; and the presence of scale-like setae on the posterior half of the pronotum.

The antennal funicle usually is only three-segmented, indicating that this species should not be included in the genus Stephanoderes; however, many of the specimens examined have a partial fourth segment with a fifth segment indicated. Because the segmentation of the funicle is rather indefinite, and since the status of the genus Stephanoderes (which is based on a five-segmented funicle) is open to question, this species is included in Stephanoderes. Other characters of generic value are absent; in fact, S. castaneus is rather difficult to separate from S. rotundicollis.

FEMALE: Length 1.5-1.8 mm., 2.30 times as long as wide, body color reddish-brown.

Frons evenly convex above, somewhat flattened below, very finely aciculate; the punctures on the lower half moderate in size, depth and density; pubescence inconspicuous. Eye shallowly emarginate; finely granulate.

Antennal club as long as scape, 1.39 times as long as wide; the first and second sutures nearly straight, the third procurved and obscure.

Pronotum 0.85 times as long as wide; four contiguous teeth on anterior margin, the median pair large, the lateral pair minute; about 16 to 22 rather large, distinct asperities between the summit and the anterior margin; summit not as high as in S. erectus, located at middle; posterior and lateral areas minutely rugulose, and with a few shallow punctures; more granulate behind summit. Pubescence consisting of rather sparse, short hair which is slightly longer in the region of the asperities; the hair intermixed with scale-like setae of equal length on posterior half of pronotum.

Elytra shining; striae scarcely impressed, punctures small and separated by a distance equal to their own diameters (variable); interstriae about two and one-half times as wide as striae, the punctures minute, shallow, rather abundant and confused. Declivity rather steep, convex. Elytral vestiture consisting of moderately abundant, inconspicuous, hair- or scale-like, interspacial setae; and uniserial rows of long, broad, truncate, scale-like, interspacial bristles, each bristle on the declivity about two to three times as long as wide and almost as long as the distance between rows of bristles, more slender

on the disc; the disc often glabrous as a result of wear.

MALE: Similar to the female except: length 1.3-1.5 mm., 2.16 times as long as wide; smaller in size; stouter; eye reduced in size, about one-half as large as in female; antennal club more slender; antennal funicle three-segmented; anterior margin of the pronotum may have from one to four teeth, or they may be entirely absent; elytral striae and punctures less distinct; and elytral vestiture somewhat longer, particularly on the sides. As many as four teeth may be present on the anterior margin of the pronotum of S. castaneus, only two may be present in S. rotundicollis.

TYPE LOCALITY: Homestead, Florida.

HOSTS: Abrus precatorius, Achras sapota, Adenantha pavonina, Annona sp., Ardisia paniculata, Bauhinia alba, B. sp., Bischofia javanica, Cassia fistula, Cinnamomum camphora, Clerodendron squamatum, Coccolobis laurifolia, Dalbergia ecastophyllum, Eugenia buxifolia, Ficus aurea, Grewia asiatica, Lysiloma bahamensis, Ocotea catesbyana, Persea borborea, P. americana (Avocado), Quercus laurifolia, Rhizophora mangle, Rhus leucantha, Salix sp., Tectona grandis, Trema floridana, and Vitis spp.

DISTRIBUTION: Southern Florida. The female holotype, male allotype, and 62 paratypes were collected June 22, 1951;

in addition 80 paratypes were collected as follows:
 Everglades National Park, July 6; Key Largo, June 25;
 Miami, July 6; Perrine, June 24; and Royal Palm Hammock
 State Park, June 22 (all collected in 1951 by R. D. Price,
 R. H. and L. D. Beamer, and S. L. Wood).

The holotype, allotype and 44 paratypes are
 located in the Snow Entomological Collections; additional
 paratypes are in the Collections of the U.S. National
 Museum, Museum of Comparative Zoology, Canadian National
 Museum, J. N. Knull, T. O. Thatcher, and the author.

Stephanoderes obesus Hopkins
 (Figs. 61, 100)

Stephanoderes obesus Hopkins, U.S. Dept. Agr.,
 Rep. No. 99, p. 30.

Of the same size and proportions as S. setosus
 Eichhoff, but the striae and striae punctures are not
 impressed. The carina more sharply elevated and frontal
 impression deeper, lateral areas of the pronotum
 distinctly punctured, anterior margin of the pronotum with
 four teeth, the bristles on the declivity narrower, and
 the larger size distinguish this species from the closely
 related S. brunneus. These two species differ from other
 North American Stephanoderes by having a transverse frontal
 carina below which is a distinctly flattened or slightly

concave impression, and by the conspicuous, rather long, recumbent, hair-like, interspacial and strial setae in addition to the usual rows of bristles.

FEMALE: Length 1.55-1.70 mm., 2.28 times as long as wide, body color testaceous to dark brown.

Frons with a slightly concave, rather broad impression occupying about one-half of distance between eyes, a prominent dorsally arched transverse carina at its upper limits; coarsely, closely punctured at sides and above, finely, more sparsely punctured in impression; sparse, rather short bristles cover the area between the transverse carina and epistoma. Eye very broadly, shallowly emarginate; finely granulate. Antennal club not as long as scape, 1.30 times as long as wide, the sutures straight.

Pronotum 0.88 times as long as wide; with four rather widely spaced teeth on anterior margin (irregularly spaced), the median pair smaller; about 18 to 24 large, distinct asperities between summit and anterior margin; summit rather high, similar to S. castaneus, located slightly behind middle; posterior and lateral areas covered with close, rather coarse, shallow punctures, the punctures becoming deeper and more granulate at summit. Pubescence consisting of rather abundant, short, erect, hair-like setae (somewhat longer anteriorly), intermixed on the posterior half with slightly longer, sparse, scale-like setae.

Elytra shining; striae not impressed, the punctures small, weakly impressed, separated by approximately their own diameters; interstriae about twice as wide as striae, the punctures minute, abundant, and confused. Declivity evenly convex, the striae scarcely evident. Elytral vestiture consisting of short, slender, rather abundant, hair-like setae; and uniserial rows of long, slightly flattened, slender, blunt bristles, each bristle about as long as the distance between rows of bristles, those on the declivity as wide at the middle as at the distal end; discal pubescence usually about as long and as abundant as that of declivity.

MALE: Similar to the female except: length 1.4 mm., 2.28 times as long as wide; eye smaller, about one-half as large as in the female; pubescence slightly longer; and marginal teeth of pronotum reduced in size, the two median ones absent in two of the three specimens examined.

TYPE LOCALITY: Cayamas, Cuba.

HOSTS: Bauhinia alba, Conocarpus erecta, Elaeagnus pungens fruitlandi, Ficus aurea, Leucaena glauca, Mangifera indica (Mango), Ocotea catesbyana, Persea borbonia, Rhizophora mangle, Trema floridana, and Vitis sp.

DISTRIBUTION: Southern Florida to Cuba. Specimens from the following localities have been examined. FLORIDA: Coconut

Grove, Delray Beach, Everglades National Park, Homestead, Key Largo, Miami, Paradise Key, Perrine, and Royal Palm Hammock State Park. CUBA: Cayamas.

The type specimen of S. obesus is located in the U.S. National Museum.

Stephanoderes brunneus Hopkins
(Figs. 62, 63, 101)

Stephanoderes brunneus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 31; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 309; Schedl, 1939, An. Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 342.

Stephanoderes frontalis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 31; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 309; Schedl, 1939, An. Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 342.

The shorter, less sharply elevated transverse carina and shallow frontal impression, the indistinctly punctured, rugulose lateral areas of the pronotum, the presence of only two widely separated teeth on the anterior margin of the pronotum, the greater width of the declivital bristles, and the smaller size distinguish this species from the closely related S. obesus. These species differ from other North American Stephanoderes by the presence of a transverse frontal carina below which is a distinct,

flattened or slightly concave impression; and by the more conspicuous, rather long, recumbent, hair-like interspatial and striae setae in addition to the uniserial rows of bristles.

FEMALE: Length 1.30-1.45 mm., 2.30 times as long as wide, body color dark brown.

Frons with a prominent, transverse carina at upper level of eyes, a shallow, rather narrow, flattened or slightly concave impression below the carina, the impression impunctate or very finely, sparsely punctured; sparse, short, coarse setae cover lower half of frons, becoming longer and more abundant on epistomal margin. Eye very broadly, shallowly emarginate; finely granulate. Antennal club not as long as scape, about 1.32 times as long as wide, the sutures straight.

Pronotum 0.84 times as long as wide; with two large, widely spaced teeth on the anterior margin, rarely with one or two small ones between them; 15 to 20 large, distinct asperities between summit and anterior margin; summit not as high as in S. obesus, located slightly behind middle; posterior and lateral areas minutely rugulose, with sparse, fine, indistinct punctures which become deep and subgranulate near the summit. Pubescence consisting of rather abundant, short, erect, hair-like setae (somewhat longer anteriorly), intermixed on the posterior half with slightly longer, sparse, scale-like setae.

Elytra shining; striae not impressed, punctures small and obscure, separated by approximately their own diameters; interstriae minutely rugulose, at least twice as wide as striae, punctures fine and confused. Declivity evenly convex, the striae scarcely evident. Elytral vestiture consisting of short, slender, hair-like setae; and uniserial rows of scale-like bristles, each bristle about as long as the distance between rows of bristles and increasing in width distally; discal pubescence usually about as long and abundant as that of the declivity.

MALE: Similar to the female except: length 1.0-1.1 mm., 2.20 times as long as wide; eye reduced in size, about one-half as large as in the female; and pubescence longer and more slender, particularly on the sides.

TYPE LOCALITY: Brownsville, Texas.

HOSTS: Acacia belandieri, Albizzia labbekoides, Annona spp., Ardisia paniculata, Bauhinia spp., Berria amonilla, Cajanus cajon, Calonyction aculeatum, Cassia fistula, Geltis laevigata, Coccolobis laurifolia, Condalia obtusifolia, Dalbergia ecastophyllum, Diphysia robinoides, Galactia spiciformis, Gliricidia sepium, Gossypium herbaceum (Cotton), Grewia asiatica, Hovenia dulcis, Ichthyomethia communis, Leucaena glauca, Lysiloma bahamensis, Malicocca bijuga, Ocotea catesbyana, Passiflora latifolia, Poinsettia heterophylla, Rhizophora mangle, Salix sp.,

Trema floridana, and Vachellia farnesiana.

DISTRIBUTION: The Rio Grande valley in Cameron County, Texas, south along the Gulf coast to Vera Cruz, Mexico; in Florida from Delray Beach south to Key West, and Gayamus, Cuba. Specimens from the following localities have been examined. FLORIDA: Delray Beach, Everglades National Park, Homestead, Key Largo, Key West, Matacumba Key, Miami, and Sugar Loaf Key. TEXAS: Brownsville, Port Isabel, Southmost, and Thayer. CUBA: Gayamus. MEXICO: Tampico, and Vera Cruz.

The type specimens of S. brunneus and of S. frontalis are located in the U.S. National Museum.

The teeth on the anterior margin of the pronotum vary somewhat geographically; 98 per cent of 129 specimens collected at Brownsville, Texas, have two teeth, 2 per cent have three teeth; 56 per cent of 117 specimens from southern Florida have two, 33 per cent have three, and 12 per cent have four marginal teeth. Other differences are not apparent.

Stephanoderes interstitialis Hopkins
(Figs. 64, 65, 102)

Stephanoderes interstitialis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 28; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 93; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 307.

Stephanoderes interunctus Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 28; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 93; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 307; Schedl, 1940, An. Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 342.

Stephanoderes approximatus Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 29; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 93; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 307.

Stephanoderes flavescens Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 29; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 602; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 309.

Stephanoderes opacipennis Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 30; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 309.

Stephanoderes quadridentatus Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 30; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 91; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 306.

The narrower declivital bristles, the occurrence of hair-like setae along the entire costal margin of the elytra, the shorter frontal impression, the larger size, and the northern distribution (except in the area where they overlap) distinguish this species from the closely related S. nitidipennis. These species differ from other North American Stephanoderes by the presence of four teeth of equal size on the anterior margin of the pronotum, the narrower declivital bristles, and the occurrence of hair-like setae on at least the anterior half of the costal margin of the elytra.

FEMALE: Length 1.5-1.7 mm., 2.32 times as long as wide, body color dark brown to black.

Frons convex, finely aciculate to coarsely reticulate, with a very short (rather variable within a series) median groove at upper level of eyes; punctures small, scattered; setae sparse, short and inconspicuous above, longer and more prominent near epistoma. Eye shallowly emarginate or sinuate; finely granulate. Antennal club slightly longer than scape, 1.43 times as long as wide, the sutures straight.

Pronotum 0.92 times as long as wide; anterior margin with four teeth of equal size separated from one another by less than their own width, the bases of the median pair frequently contiguous, rarely with one or two additional granules; asperities of moderate size, rather

abundant; posterior and lateral areas finely rugose, with a shallow puncture of moderate size at base of each seta in the lateral areas, the punctures becoming granulate dorsally. Pubescence consisting of hair-like setae which are longer in the asperate region, intermixed on the posterior one-half of the pronotum with rather sparse, scale-like setae.

Elytra shining; striae distinctly impressed, the punctures of moderate size, strongly impressed, separated by less than one-half their own diameters; interstriae as wide as striae, the punctures small, granulate, evenly spaced in irregular rows; each granule bearing an erect bristle. Declivity steep, convex; striae more deeply impressed than on disc; interspaces more convex with the granules larger than on disc. Elytral vestiture consisting of minute, inconspicuous, hair-like, strial setae; and uniserial rows of conspicuous bristles; the bristles at elytral base short and broad, usually less than three times as long as wide, those on declivity as long as the distance between rows of bristles, narrow, at least five times as long as wide, longer and almost hair-like on the ninth interspace at base of declivity of some specimens.

MALE: Similar to the female except: length 1.1-1.2 mm., 2.10 times as long as wide; eye reduced in size, slightly less than one-half as large as in female; one or more of the teeth on anterior margin of pronotum may be absent;

declivity not as steep; striae less definite; elytral pubescence much longer and more slender on the disc and sides.

TYPE LOCALITY: Victoria, Texas.

HOSTS: Acacia sp., Acer rubrum, Aesculus sp., Albizzia sp., Carya spp., Gercis canadensis, Diospyros virginiana, Fagus grandifolia caroliniana, Juglans nigra, Liquidambar styraciflua, Magnolia spp., Morus rubra, Ocotea catesbyana, Persea borbonia, Picea sp., Platanus occidentalis, Prosopis sp., Quercus spp., Rhododendron sp., Rhus spp., Smilax sp., and Vitis spp.

DISTRIBUTION: The United States south and east of a line from the lower Rio Grande valley of Texas, through Lawrence, Kansas, to Connecticut, except in Florida south of Lake Okeechobee. Specimens from the following localities have been examined. ALABAMA: Mobile, and Theodore. CONNECTICUT: Branford, and Hamden. DISTRICT OF COLUMBIA: Washington. FLORIDA: Dade City, Dunedin, Gainesville, Jacksonville, La Belle, Monticello, Oleno State Park, Sanford, Sebring, Snead, and Suwannee Springs. GEORGIA: Brunswick. ILLINOIS: East St. Louis, and Lawrenceville. KANSAS: Lawrence. KENTUCKY: Williamsburg. LOUISIANA: Covington, Krotz Springs, and St. Bernard. MARYLAND: Plummers Island. MISSISSIPPI: Corinth, Meridian, Nicholson, and Vicksburg. NEW JERSEY: Hapatcong, and

Ramsey. NORTH CAROLINA: Aberdeen, Black Mountains, Cherokee, and Monroe. PENNSYLVANIA: Allegheny, Hummelstown, and Wind Gap. SOUTH CAROLINA: Awendaw, and Jacksonboro. TENNESSEE: Gatlinburg. TEXAS: Brownsville, Columbus, Dallas, Southmost, and Victoria. VIRGINIA: Blacksburg, and Loudoun. WEST VIRGINIA: Morgantown.

The type specimens of S. interstitialis, S. interpunctus, S. approximatus, S. flavescens, S. opacipennis, and S. quadridentatus are located in the U.S. National Museum.

Stephanoderes nitidipennis Hopkins
(Figs. 66, 103)

Stephanoderes nitidipennis Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 29.

Stephanoderes nitidulus Hopkins, 1915, U.S. Dept.

Agr., Rep. No. 99, p. 29.

Stephanoderes subopacicollis Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 30.

The slightly wider declivital bristles, the occurrence of hair-like setae on only the anterior part of the costal margin of the elytra, the longer frontal groove, the smaller size, and the southern distribution distinguish this species from the closely allied S. interstitialis. These species differ from other North American Stephanoderes

by the presence of four teeth of equal size on the anterior margin of the pronotum, the narrower declivital bristles, and the occurrence of hair-like setae on at least the anterior half of the costal margin of the elytra.

FEMALE: Length 1.25-1.55 mm., 2.40 times as long as wide; body dark brown to black.

Frons convex, coarsely reticulate; a narrow median groove extending from upper level of eyes about one-half of the distance to epistomal margin; punctures shallow, of moderate size, rather sparse, and inconspicuous. Pubescence short, sparse and inconspicuous above, longer and more conspicuous near epistomal margin. Eye shallowly emarginate; finely granulate. Antennal club as long as scape, about 1.3 times as long as wide; the sutures straight.

Pronotum 0.94 times as long as wide; the anterior margin with four teeth of equal size, separated from one another by less than the basal width of one tooth, the bases of the median pair occasionally contiguous; asperities of moderate size, numerous; posterior and lateral areas with a shallow puncture of moderate size at the base of each seta, those near and behind the summit granulate. Pubescence consisting of hair-like setae which are longer in the asperate region, intermixed on the posterior one-half with rather sparse, scale-like setae.

Elytra shining; striae distinctly impressed, the punctures of moderate size, rather deep, separated by less than one-half their own diameters; interstriae as wide as striae, the punctures small, evenly spaced in uniserial rows, becoming granulate posteriorly, each puncture bearing an erect bristle. Declivity steep, convex; striae somewhat more deeply impressed; interspaces slightly more convex with the punctures granulate. Elytral vestiture consisting of minute, inconspicuous, hair-like setae and uniserial rows of bristles; the bristles at the elytral base short and broad, less than three times as long as wide, those on the declivity longer and narrower, about four to five times as long as wide, longer and more slender on the ninth interspace at base of declivity, but never hair-like; setae on only the anterior third of costal margin of elytra hair-like, distinctly flattened on the posterior half.

MALE: Similar to the female except: length 1.0-1.1 mm., 2.2 times as long as wide; eye reduced in size about one-third as large as in female; one or more teeth on anterior margin of pronotum may be absent; declivity not as steep; striae less definite; elytral pubescence much longer and more slender on the disc and sides.

TYPE LOCALITY: Cayamas, Cuba.

HOSTS: Ardisia paniculata, Amerimnon brownel, Candiosperma holacacobum, Dipholis salicifolia, Erythrina sp., Eugenia buxifolia, Ficus sp., Galactia spiciformis, Ichthyomethia communis, Ipomoea cathartica, Ocotea catesbyana, Quercus laurifolia, Salix sp., Sida rhombifolia, Torrubia longifolia, and Trema floridana.

DISTRIBUTION: Florida, from Dade City south to Key West, and Cuba. Specimens from the following localities have been examined. FLORIDA: Biscayne, Everglades National Park, Dade City, Homestead, Key Largo, Key West, Matacumba Key, Miami and Planation Key. CUBA: Cayamas.

The type specimens of S. nitidipennis, S. nitidulus, and S. subopacicollis are located in the U.S. National Museum.

Stephanoderes rufescens Hopkins

This species was described from specimens collected at Allegheny, Pennsylvania. Of the twenty-five specimens examined, nine bear a host label "Found in Brazil Nut," presumably Bertholletia excelsa. Evidently this is a Neotropical species occasionally collected from imported Brazil Nuts. It is more closely allied to S. nitidipennis than to any other North American species, but differs as follows: frontal groove much longer and more prominent; pronotal asperities smaller; stria punctures

larger and deeper; declivity not as steep; elytral bristles slightly shorter; and the bristles along the costal margin and ninth interspace not noticeably more slender or longer than elsewhere on the elytra.

Stephanoderes squamosus Hopkins
(Figs. 67, 104)

Stephanoderes squamosus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 26.

This species is not closely related to any other North American species of the genus, although it is more nearly allied to S. interstitialis, S. nitidipennis, and S. niger, than to others. It is distinguished from all other North American Stephanoderes by the more nearly flattened, deeply striate declivity; the distinctly elevated ridge (only in the female) on the lateral margins of the declivity formed by the junction of interspaces five and seven, four and eight, and three and nine; and the broad scale-like interspatial bristles which are as wide at the base as at the apical end.

FEMALE: Length 1.35-1.50 mm., 2.38 times as long as wide; body color black, except the asperate area of the pronotum which may be castaneous, and the legs and antennae which may be testaceous.

Frons convex except flattened near the epistoma; coarsely reticulate, with a small granule at the base of

each seta; setae coarse, short, sparse. Eye sinuate to very shallowly emarginate; finely granulate. Antennal club not as long as scape, about 1.4 times as long as wide, the sutures straight.

Pronotum 0.90 times as long as wide; anterior margin with four teeth of equal size separated from one another by a distance less than the basal width of one tooth; asperities rather small, numerous; lateral and posterior areas finely rugose, with a granulate puncture at the base of each scale-like seta near and behind the summit. Pubescence consisting of hair-like setae which are longer in the asperate region, intermixed on the non-asperate area with short, rather broad, scale-like setae.

Elytra shining; striae slightly impressed, the punctures of moderate size, distinctly impressed, separated by less than one-half their own diameters; interstriae rugose, as wide as striae, the punctures small, granulate, evenly spaced in uniserial rows, each bearing an erect, scale-like bristle. Declivity rather steep, weakly convex (almost flattened); striae and strial punctures deeply impressed; interspaces strongly convex, granulate; a distinctly elevated ridge on the lateral margin formed by the junction of interspaces five and seven, four and eight, and three and nine. Elytral vestiture consisting of minute, inconspicuous hair-like strial setae, one arising from each puncture; and uniserial rows of scale-

like interstitial bristles, one arising from each puncture; bristles at elytral base less than one-third as long as those on declivity; each declivital bristle about three to four times as long as wide, as wide at its base as at its apex, the greatest width near the middle of each scale.

MALE: Similar to the female except: length 0.90-1.15 mm., 2.30 times as long as wide; eye reduced in size, about one-third as large as in female; one or more of the teeth on anterior margin of pronotum may be absent; declivity not as steep; ridge at lateral margin of declivity absent; and elytral pubescence much longer on disc and sides.

TYPE LOCALITY: Cayamas, Cuba.

HOSTS: Ardisia paniculata, Dipholis salicifolia, Galactia spiciformis, Ichthyomethia communis, Lysiloma bahamensis, Parthenocissus quinquefolia, Pithecellobium unguis-cati, and Torrubia longifolia.

DISTRIBUTION: Southern Florida and the Keys, and Cuba.

Specimens from the following localities have been examined.

FLORIDA: Everglades National Park, Key Largo, and

Matacumbe Key. CUBA: Cayamas.

The type specimen of S. squamosus is in the U.S. National Museum.

Stephanoderes niger Hopkins
(Figs. 71, 109)

Stephanoderes niger Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 31; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 309; Schedl, 1940, An. Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 342.

The larger body size, the longer, more slender, pointed bristles on the ninth interspace at the posterior-lateral angles of the elytra, and the more deeply impressed declivital striae separate the female of this species from the female of the closely related S. sparsus. These two species are distinguished from the allied S. obscurus, S. andersoni, S. liquidambarae, and S. georgiae by: a stouter body form; stouter pronotum (about 0.90 times as long as wide); only four (often fewer) teeth on the anterior margin of the pronotum; and the occurrence of granulate punctures on the posterior-lateral areas of the pronotum.

FEMALE: Length 1.4-1.5 mm., 2.26 times as long as wide, body color brown to black.

Frons convex, with a weak transverse impression above the epistoma, and a short, rather wide median groove at upper level of eyes; surface rather coarsely reticulate above and at sides below, the punctures fine, shallow, rather sparse; pubescence fine, short, and inconspicuous above, longer and more conspicuous near the epistoma. Eye broadly, shallowly emarginate; finely granulate. Antennal

club as long as scape, 1.44 times as long as wide; the first suture straight, sutures one and two weakly procurved.

Pronotum 0.90 times as long as wide; anterior margin with four teeth of equal size, the median pair usually contiguous, the lateral pair usually separated from the median ones by a distance less than the basal width of one tooth; asperities rather large, about twenty-five in number; lateral areas coarsely reticulate, with sparse, granulate punctures at base of each scale, somewhat more coarsely granulate behind summit. Pubescence consisting of hair-like setae which are longer in the asperate area, intermixed on posterior non-asperate area with scale-like setae slightly longer than adjacent hair.

Elytra shining; striae slightly impressed anteriorly, more strongly impressed posteriorly, the punctures of moderate size, deeply impressed, separated by less than one-half their own diameters; interstriae slightly narrower than striae, punctures coarsely granulate, evenly spaced in uniserial rows and each bearing an erect scale-like bristle. Declivity steep, convex; striae more strongly impressed than on disc; interstriae weakly elevated, coarsely granulate. Elytral vestiture consisting of small inconspicuous hair-like strial setae; and uniserial rows of erect scale-like bristles, each bristle on the declivity almost as long as

the distance between rows of bristles, one and one-half to two times as long as wide; each bristle longer, more slender (about five times as long as wide) and pointed on the ninth interspace at the posterior-lateral angles of the elytra; the setae on costal margin of elytra more slender, but not entirely hair-like anteriorly.

MALE: Unknown.

TYPE LOCALITY: Brownsville, Texas.

HOSTS: Unknown.

DISTRIBUTION: The nine specimens at hand are all from Brownsville, Texas. Schedl (1940) adds Tampico, Mexico.

The type specimen of S. niger is located in the U.S. National Museum.

Stephanoderes sparsus (Hopkins)
(Figs. 73, 74, 110)

Hypothenemus sparsus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 20; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 87; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 292.

Hypothenemus similis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 20; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 295.

Stephanoderes tridentatus Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 31; Chamberlin, 1939, the Bark and Timber Beetles of North America North of Mexico, p. 306.

The smaller body size, the more scale-like bristles on the posterior part of the ninth interspace, and the less deeply impressed declivital striae separate this species from S. niger. These two species are distinguished from S. obscurus, S. andersoni, S. liquidambarae, and S. georgiae by the stouter body form, the shorter pronotum (about 0.90 times as long as wide), the presence of only four (often fewer) teeth on the anterior margin of the pronotum, and the occurrence of granulate punctures on the posterior-lateral areas of the pronotum.

FEMALE: Length 1.15-1.30 mm., 2.30 times as long as wide, body color dark brown to black.

Frons uniformly convex, with a short, inconspicuous median groove at upper level of eyes; surface coarsely reticulate, punctures minute, inconspicuous; pubescence fine, short, and inconspicuous above, longer and more conspicuous near epistoma. Eye broadly sinuate, not emarginate; finely granulate. Antennal club longer than scape, 1.55 times as long as wide, the sutures straight.

Pronotum 0.88-0.90 times as long as wide; anterior margin with four teeth of equal size, frequently one or two

teeth missing, the spacing close, usually irregular; lateral areas coarsely reticulate, with sparse, granulate punctures at base of each scale, somewhat more coarsely granulate behind summit. Pubescence consisting of hair-like setae which are longer in asperate area, intermixed on posterior non-asperate area with scale-like setae which are slightly longer than adjacent hair.

Elytra shining; striae slightly impressed, the punctures of moderate size, deeply impressed, separated by less than one-half their own diameters; interstriae slightly narrower than striae, the punctures coarsely granulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex, striae and interstriae as on disc, except the interspacial granules larger. Elytral vestiture consisting of small inconspicuous hair-like strial setae; and uniserial rows of erect scale-like bristles, each bristle on the declivity slightly shorter than the distance between rows of bristles, and one and one-half times as long as wide, only slightly longer, but still scale-like laterally; the setae on the costal margin of the elytra more slender, but not entirely hair-like anteriorly.

MALE: Unknown.

TYPE LOCALITY: Columbus, Texas.

HOSTS: Celtis pallida, and Rhamnus sp.

DISTRIBUTION: Southeastern Texas to Mississippi.

Specimens from the following localities have been examined. MISSISSIPPI: Natchez. TEXAS: Brownsville, Columbus, Hidalgo County, Karnes City, Lexington, and San Diego.

The type specimens of H. sparsus, H. similis, and S. tridentatus are located in the U.S. National Museum.

Stephanoderes obscurus (Fabricius)
(Figs. 68, 105)

Hylesinus obscurus Fabricius, 1801, Systema Eleuth., vol. 2, p. 395.

Stephanoderes obscurus, Eggers, 1929, Wien Ent. Ztg., vol. 56, p. 50; Schedl, 1939, Münch. Ent. Gesellschaft, vol. 29, p. 564; Schedl, 1940, Arb. morph. tax. Ent., vol. 7, p. 206.

Cryphalus hispidulus Leconte, 1868, Trans. Amer. Ent. Soc., vol. 2, p. 156; Eichhoff, 1879, Ratio ... Tomicinorum, p. 136.

Hypothenemus hispidulus, Leconte, 1876, Proc. Amer. Phil. Soc., vol. 15, p. 355; Schwarz, 1878, Proc. Amer. Phil. Soc., vol. 17, p. 468; Hamilton, 1888, Trans. Amer. Ent. Soc., vol. 16, p. 158; Smith, 1890, Ent. Amer., vol. 6, p. 54; Blandford, 1894, Insect Life, vol. 6, p. 263; Hamilton, 1894, Trans. Amer. Ent. Soc., vol. 21, p. 406;

Eichhoff and Schwarz, 1896, Proc. U.S. Nat. Mus., vol. 18, pp. 608, 610; Smith, 1900, Catalogue of the Insects of New Jersey, p. 362; Blandford, 1904, Biol. Centr. Amer., Coleoptera, vol. 4, pt. 6, p. 230; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 13; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 596; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 289.

Stephanoderes hispidulus, Currie, 1905, U.S. Dept. Agr., Bull. No. 53, pp. 7, 13.

Stephanoderes seriatus Eichhoff, 1871, Berlin Ent. Zeit., p. 133; Leconte, 1876, Proc. Amer. Phil. Soc., vol. 15, p. 356; Eichhoff, 1879, Ratio ... Tomicinorum, p. 158; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 22; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 600; Chamberlin, 1939, the Bark and Timber Beetles of North America North of Mexico, p. 303; Schedl, 1949, La Plata Univ. Nac. Inst. Mus. Notas (Zool.), vol. 14, no. 116, p. 35.

Stephanoderes guatemalensis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 26; Schedl, 1940, An. Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 242; Schedl, 1940, Arb. morph. tax. Ent., vol. 7, p. 207.

Stephanoderes brasiliensis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 26.

Stephanoderes lecontei Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 27; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 600; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 305.

The presence of a subtuberculate frontal elevation at the upper level of the eyes, the slight longitudinal concavity of the frons between the elevation and the epistomal margin, the slightly more slender elytral bristles, and the slightly stouter pronotum with six marginal teeth of equal size distinguish the female of this species from the females of S. andersoni, S. liquidambarae, and S. georgiae. These four species are distinguished from other North American Stephanoderes by the presence of six teeth on the anterior margin of the pronotum; and the length and width of the pronotum about equal.

FEMALE: Length 1.4-1.6 mm., 2.34 times as long as wide, body color dark brown to black.

Frons convex, distinctly elevated medially (often almost tuberculate) at upper level of eyes; a narrow median groove extending from summit of the elevation about one-fourth to three-fourths of the distance toward the epistomal margin (variable); indistinctly flattened on lower half producing a slight longitudinal concavity between summit of elevation and epistomal margin; surface coarsely

reticulate, with fine, scattered punctures on lower half; pubescence consisting of fine, sparse, short hair which becomes longer and more conspicuous toward the epistomal margin. Eye with a shallow emargination; finely granulate. Antennal club as long as scape, 1.44 times as long as wide; the sutures straight.

Pronotum 0.98 times as long as wide; anterior margin with six teeth of equal size, separated from one another by a distance less than the basal width of one tooth; often with one or two smaller granules lateral to the marginal teeth; asperities rather small, numerous; lateral areas finely rugose, with rather abundant, shallow punctures of moderate size, the punctures become granulate dorsally and to a lesser extent anteriorly. Pubescence consisting of hair-like setae which are longer in the asperate region, intermixed on the non-asperate area with longer, rather broad, scale-like setae.

Elytra shining; striae slightly impressed, the punctures of moderate size, deeply impressed, separated by less than one-half their own diameters; interstriae slightly narrower than striae, punctures small, subgranulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex; striae impressed slightly more than on the disc; interstitial punctures subgranulate. Elytral vestiture consisting of minute, inconspicuous, hair-like setae; and uniserial

rows of erect scale-like bristles, each bristle on the declivity about as long as the distance between rows of bristles and two to three times as long as wide, not noticeably longer laterally; setae on costal margin of elytra hair-like on the anterior one-fourth.

MALE: Similar to the female except: length 1.0-1.1 mm., 2.2 times as long as wide; eye reduced in size, about one-third as large as in female; one or more teeth on anterior margin of pronotum may be absent; declivity not as steep; striae less definite; elytral pubescence much longer and more slender on disc and sides.

TYPE LOCALITY: Cuba.

HOSTS: Abrus precatorius, Abutilon mollissimum, Achras sapota, Adenantha pavonina, Albizia lebbekoides, Aloe vera, Annona spp., Bauhinia grandiceps, Betula sp., Bidens pilosa, Boehmeria scabra, Bucida buceras, Carya spp., Cinnanomum camphora, Clerodendron squamatum, Dalbergia ecastophyllum, Diphysia robinoides, Erythrina sp., Ficus sp., Gelsemium sempervirens, Gliricidia sepium, Grewia asiatica, Ichthyomethia commuhis, Juglans nigra, Magnolia spp., Mangifera indica (Mango), Morus rubra, Ocotea catesbyana, Parmentiera edulis, Passiflora latifolia, Persea americana (Avocado), Phalocarpus septentrionis, Phaseolus limensis (Lima Bean), Platanus occidentalis,

Quercus spp., Quisqualis indica, Rhizophora mangle,
Rhododendron sp., Rhus spp., Ricinus communis, Salix sp.,
Schleichera trijuga, Sida rhombifolia, Smilax sp.,
Taxodium distichum, Urena sp., Verbesina laciniata, Vitis
spp., Waltheria americana, Yucca spp., and Zea mays (Corn).

DISTRIBUTION: The United States south and east of a line from the lower Rio Grande Valley of Texas, through Lawrence, Kansas, to New Jersey. Specimens from the following localities have been examined. ALABAMA: Mobile. FLORIDA: Delray Beach, Everglades National Park, Homestead, Jacksonville, Key Largo, Key West, La Belle, Miami, Perrine, Sanford, Sebring, and West Palm Beach. GEORGIA: Brunswick, and Riceboro. INDIANA: Shoals. KANSAS: Lawrence. KENTUCKY: Cumberland Falls State Park. LOUISIANA: Covington, Greole, and Krotz Springs. NORTH CAROLINA: Cherokee, Marston, Tryon, and Wilmington Beach. NEW JERSEY: St. Cloud. NEW YORK: Mosholu. PENNSYLVANIA: Easton, and Swarthmore. SOUTH CAROLINA: Awendaw, Jacksonboro, and St. Helena Island. TENNESSEE: Gatlinburg. TEXAS: Boca Chica, Brownsville, Columbus, Donna, Los Indios, and Victoria. VIRGINIA: Accomack. BRAZIL: Pernambuco, Santarem, and Vicosa. CUBA: Cayamas. GUATEMALA: Trece Aguas. PUERTO RICO: Corozol, and Rio Piedras. Also Honduras, Mexico, and Panama, the exact locality not recorded.

The type specimens of S. brasiliensis, S. guatemalensis, and S. lecontei are located in the U.S. National Museum, that of Hypothenemus hispidulus is in the Museum of Comparative Zoology. The first specimen in Leconte's series of H. hispidulus (recognized as the type) belongs to this species; the second, third and fourth specimens are H. eruditus. The specimen from Mexico in the Eggers collection at the U.S. National Museum, compared with the type of Hylesinus obscurus by Eggers, was used as the basis for this species; this specimen was compared with paratypes of S. heterolepsis Costa Lima and found to be distinct. Costa Lima's species is allied to S. brunneus.

Specimens from Pennsylvania have virtually no frontal tubercle, but have a rather conspicuous median groove; those from Key West, Florida (and south), have only a slight median groove, but have a rather large frontal tubercle. Series obtained from localities between these points intergrade completely in a north-south cline. To illustrate this cline, series from Cherokee, North Carolina, Homestead and Key West, Florida, and Brownsville, Texas, were selected for study and divided into three classes as follows: first, those with a weakly developed frontal tubercle and a strong, narrow, median groove; second, those with a rather large tubercle and a strong groove; and

TABLE 3

The frequency distributions of three classes of frontal sculpture
in Stephanoderes obscurus (Fabricius).

Locality	Percentage with Strong tubercle Weak groove	Percentage with Strong tubercle Strong groove	Percentage with Weak tubercle Strong groove	Number of Specimens Examined
Cherokee, North Carolina	3	7	90	30
Homestead, Florida	62	33	4	51
Key West, Florida	100	0	0	28
Brownsville, Texas	16	34	50	32

third, those with a large tubercle and virtually no groove. The results appear in Table 3. Since the few specimens examined from areas north of North Carolina fall into the first class and those from areas south of Key West fall into the third class, it might be concluded that these features of the frons are directly influenced by the climate. However, if this is correct a higher percentage of specimens from Brownsville, Texas, should fall into the first class rather than the third. Evidently southern Texas is a region where hybridization of class one and three is occurring, or the factors causing selection in the eastern portion of North America are absent.

Stephanoderes andersoni, new species
(Figs. 69, 106)

The coarsely, closely, deeply punctured frons of this species is unique among North American Stephanoderes. In addition the slightly larger, widely spaced marginal teeth of the pronotum distinguish this species from the closely allied S. obscurus, S. liquidambarae, and S. georgiae. These four species are distinguished from other North American Stephanoderes by the presence of six teeth on the anterior margin of the pronotum, and the more slender pronotum which is about equal in length and width.

FEMALE: Length 1.5-1.7 mm., 2.45 times as long as wide, body color dark brown.

Frons convex, with a short, indistinct, median impression (sometimes absent) at upper level of eyes; surface covered with conspicuous, coarse, close, deep punctures, except on a rather broad median line between the median impression and the epistomal margin; pubescence consisting of rather sparse, fine hair of medium length on the punctured area. Eye shallowly emarginate; finely granulate. Antennal club longer than scape, about 2.3 times as long as wide; the first suture straight, sutures two and three slightly bisinuate.

Pronotum 1.00 times as long as wide; anterior margin with six teeth of equal size, separated from one another by a distance equal to, or slightly greater than, the basal width of one tooth; often with one or two smaller granules lateral to the marginal teeth; asperities rather small, numerous; lateral area with shallow, moderately abundant punctures of medium size, the punctures become granulate dorsally. Pubescence consisting of longer, hair-like setae in asperate region, intermixed posteriorly in non-asperate area with longer, broad, scale-like setae.

Elytra shining; striae slightly impressed, the punctures of moderate size, deeply impressed, separated by less than one-half their own diameters; interstriae slightly narrower than striae, punctures small, not granulate, evenly spaced in uniserial rows, each bearing

an erect scale-like bristle. Declivity steep, convex; striae as on disc; interstitial punctures not granulate. Elytral vestiture consisting of small, inconspicuous hair-like strial setae; and uniserial rows of erect scale-like bristles, each bristle on declivity about as long as the distance between rows of bristles, and two to two and one-half times as long as wide, not noticeably longer laterally; the setae on costal margin of elytra more slender, becoming hair-like on anterior one-fourth.

MALE: Similar to the female except: length 1.3 mm., about 2.2 times as long as wide; eye reduced in size, about one-half as large as in female; one or more teeth on anterior margin of pronotum may be absent; declivity not as steep; striae less definite; elytral pubescence longer and more slender on disc and sides.

TYPE LOCALITY: Coconut Grove, Florida.

HOSTS: Acrocomia vinifera, Bauhinia tomentosa, Gossypium herbaceum, Mucuna sp., Sida rhombifolia, Tamarindus indica, and Thespesia pulpuinea.

DISTRIBUTION: Southern Florida, from Miami to Key West, and the Island of St. Croix. The female holotype and 3 paratype were collected April 30, 1945; the allotype and 3 paratypes at Coconut Grove, March 31; in addition 45 paratypes were collected at Coconut Grove, March 12, 1917,

and September 8, 1944; Key West, July 3, 1951, by R. D. Price, R. H. and L. D. Beamer, and S. L. Wood; and Christiansted, St. Croix (Virgin Islands) March 2, 1941.

The holotype, allotype, and 43 paratypes are located in the U.S. National Museum; additional paratypes are located in the Snow Entomological Collections, and in the collection of the author.

This species is named for Dr. W. H. Anderson who first recognized it as an undescribed species.

Stephanoderes liquidambarae, new species
(Figs. 70, 107)

This species is closely allied to S. georgiae. Since the frons of some variants of these species are virtually identical, the most reliable characters of S. liquidambarae for separating it from S. georgiae are: pronotum finely punctured and coarsely reticulate, but not granulate-punctate behind the summit; interstitial punctures on the disc fine, not at all granulate; and the declivital bristles somewhat shorter and of greater width. In addition to the frons (of some variants), other features common to these two species are: the lateral pair of teeth on the anterior pronotal margin distinctly smaller in size; and the elytral bristles usually of greater width than in related species.

FEMALE: Length 1.45-1.6 mm., 2.36 times as long as wide, body color black.

Frons convex, with an indistinct, broad, median elevation extending from upper level of eyes to epistomal margin; surface coarsely reticulate above and on sides below, the punctures fine, shallow, and rather sparse; often with an elongate puncture at upper end of the median elevation suggesting a slight median groove; pubescence fine, short, and inconspicuous above, longer and more conspicuous near the epistoma. Eye shallowly emarginate; finely granulate. Antennal club longer than scape, about 2.3 times as long as wide; the first suture straight, sutures two and three slightly bisinuate.

Pronotum 1.00 times as long as wide; anterior margin with six teeth, the lateral pair reduced in size, the four median ones separated from each other by a distance slightly less than the basal width of one tooth, the lateral pair usually more widely spaced; asperities rather small, numerous; lateral and posterior areas with shallow, moderately abundant punctures of rather small size, becoming granulate near summit; the surface coarsely reticulate and punctured in area behind summit. Pubescence consisting of longer hair-like setae in asperate area, intermixed on posterior non-asperate area with broad, scale-like setae slightly longer than adjacent hair.

Elytra shining; striae slightly impressed, the punctures of moderate size, deeply impressed, separated by less than one-half their own diameters; interstriae slightly narrower than striae, the punctures small, not granulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex; striae and interstriae slightly narrower than on disc; interstitial punctures subgranulate. Elytral vestiture consisting of small, inconspicuous, hair-like strial setae; and uniserial rows of erect scale-like bristles, each bristle on declivity slightly shorter than the distance between rows of bristles, and about one and one-half times as long as wide, not noticeably longer or more slender laterally; the setae on costal margin of elytra more slender, becoming hair-like on anterior one-fourth.

MALE: Similar to the female except: length 1.0-1.1 mm., 2.20 times as long as wide; eye reduced in size about one-third as large as in female; one or more teeth on anterior margin of pronotum may be absent; declivity not as steep; striae less definite; elytral pubescence much longer and more slender on disc and sides.

TYPE LOCALITY: Jacksonboro, South Carolina.

HOST: Liquidambar styraciflua.

DISTRIBUTION: Known from the following localities in the southeastern United States. The female holotype, male allotype, and 51 paratypes were collected July 13. In addition 16 paratypes were collected as follows: Krotz Springs, Louisiana, June 7; and Sanford, Florida, July 11; all collected in 1951 by R. D. Price, R. H. and L. D. Beamer, and S. L. Wood.

The holotype, allotype, and 12 paratypes are located in the Snow Entomological Collections. Additional paratypes are in the U.S. National Museum and the collection of the author.

Stephanoderes georgiae Hopkins
(Figs. 72, 108)

Stephanoderes georgiae Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 26; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 600; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 303.

Stephanoderes texanus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 26; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 94; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 305.

Stephanoderes pini Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 27; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 600; Chamberlin, 1939, The

Bark and Timber Beetles of North America North of Mexico,
p. 305.

Stephanoderes salicis Hopkins, 1915, U.S. Dept.
Agr., Rep. No. 99, p. 27; Blatchley and Leng, 1916,
Rhynchophora of North Eastern America, p. 600; Chamberlin,
1939, The Bark and Timber Beetles of North America North
of Mexico, p. 305.

Stephanoderes floridensis Hopkins, 1915, U.S. Dept.
Agr., Rep. No. 99, p. 27; Blatchley and Leng, 1916,
Rhynchophora of North Eastern America, p. 601; Chamberlin,
1939, The Bark and Timber Beetles of North America North of
Mexico, p. 306.

Stephanoderes ficus Hopkins, 1915, U.S. Dept.
Agr., Rep. No. 99, p. 28; Blatchley and Leng, 1916,
Rhynchophora of North Eastern America, p. 601; Blackman,
1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 94;
Chamberlin, 1939, The Bark and Timber Beetles of North
America North of Mexico, p. 308.

Stephanoderes soltaui Hopkins, 1915, U.S. Dept.
Agr., Rep. No. 99, p. 28; Blatchley and Leng, 1916,
Rhynchophora of North Eastern America, p. 601; Chamberlin,
1939, The Bark and Timber Beetles of North America North
of Mexico, p. 308.

Stephanoderes lucasi Hopkins, 1915, U.S. Dept.
Agr., Rep. No. 99, p. 28; Blackman, 1922, Miss. Agr. Exp.
Sta., Tech. Bull. 11, p. 94; Chamberlin, 1939, The Bark and

Timber Beetles of North America North of Mexico, p. 308.

Stephanoderes virentis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 28; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 601; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 308.

Stephanoderes pecanis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 29; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 601; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 308.

Hypothenemus robustus Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 88; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 293.

This species is closely related to S. liquidambarae, and also rather closely allied to S. obscurus and S. andersoni. From the female of S. liquidambarae the female may be separated by: distinctly granulate pronotum behind the summit; interstitial punctures on the disc slightly larger and at least indistinctly granulate; and narrower declivital bristles. The male is smaller, has narrower elytral scales, and a less prominent frontal elevation than the male of S. liquidambarae. The absence of an elevation at the upper level of the eyes, or of

coarse, close, deep punctures on the frons will distinguish it from S. obscurus and S. andersoni. These four species are distinguished from other North American Stephanoderes by the presence of six teeth on the anterior margin of the pronotum, and the more slender pronotum which is about equal length and width.

FEMALE: Length 1.4-1.5 mm., 2.40 times as long as wide, body color black.

Frons convex with the median line very feebly raised and usually with a median groove extending from upper level of eyes a variable distance toward the epistomal margin; surface coarsely reticulate above and on sides below, punctures fine, shallow, rather sparse; pubescence fine, short, and inconspicuous above, longer and more conspicuous near epistoma. Eye shallowly emarginate; finely granulate. Antennal club longer than scape, 1.44 times as long as wide; the first suture straight, sutures two and three slightly bisinuate.

Pronotum 1.00 times as long as wide; anterior margin with six teeth, the lateral pair reduced in size, the four median ones separated from one another by a distance slightly less than the basal width of one tooth, the lateral pair usually more widely spaced; asperities rather small, and numerous; lateral areas with rather abundant, shallow punctures of moderate size, becoming granulate near asperate area and behind summit to base.

Pubescence consisting of longer hair-like setae in asperate area, intermixed on posterior non-asperate area with scale-like setae slightly longer than adjacent hair.

Elytra shining; striae slightly impressed, the punctures of moderate size, deeply impressed, separated by less than one-half their own diameters; interstriae slightly narrower than striae, the punctures small, subgranulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex; striae and interstriae slightly narrower than on disc; interstitial punctures granulate. Elytral vestiture consisting of small, inconspicuous, hair-like, strial setae; and uniserial rows of erect scale-like bristles, each bristle on declivity slightly shorter than the distance between rows of bristles and one and one-half to two and one-half times as long as wide, not noticeably longer laterally; setae on costal margin of elytra more slender, but not entirely hair-like anteriorly.

MALE: Similar to the female except: length 0.8-1.0 mm., 2.20 times as long as wide; eye reduced in size, about one-third that of female, often with as few as twenty scattered facets; one or more teeth on anterior margin of pronotum may be absent; declivity not as steep; striae less definite; and the elytral pubescence slightly longer and more slender on disc and sides.

TYPE LOCALITY: Georgia.

HOSTS: Acacia sp., Aleurites fordii (Tung), Bambusa tulda, Callicarpa sp., Carya spp., Cercis canadensis, Citrus aurantifolia (Lime), Coccolobis laurifolia, Dipholis salicifolia, Erythrina sp., Ficus sp., Hibiscus moscheutos, Juglans nigra, Magnolia sp., Parthenocissus gunquefolia, Philibertella clausa, Pinus sp., Pithecellobium guadelupense, Poinsettia heterophylla, Rhizophora mangle, Schleichera trijuga, Tectona grandis, Urena sp., Verbesina laciniata, and Wisteria sp.

DISTRIBUTION: The United States south of a line drawn from the lower Rio Grande Valley of Texas, through southern Kentucky to West Virginia. Specimens from the following localities have been examined. ALABAMA: Foley, and Mobile. FLORIDA: Brooksville, Coconut Grove, Dunedin, Fort Myers, Gainesville, Hernando County, Homestead, Indian River, Key Largo, Key West, Miami, Monticello, Orlando, Osceola County, Plantation Key, St. Lucie, Sebring, Sugar Loaf Key, and Tampa. KENTUCKY: Cumberland Falls State Park. LOUISIANA: Baton Rouge, Covington, New Orleans, and Tallulah. MISSISSIPPI: Lucedale, and Maxie. NORTH CAROLINA: Monroe. SOUTH CAROLINA: Awendaw, and Charleston. TEXAS: Angleton, Boca Chica, Brownsville, Columbus, Lexington, Rockdale, San Antonio, San Diego,

and Sugarland. WEST VIRGINIA: Morgantown.

The type specimens of S. georgiae, S. texanus, S. pini, S. salicis, S. floridensis, S. ficis, S. soltaui, S. lucasi, S. virentis, S. pecanis, and Hypothenemus robustus are located in the U.S. National Museum.

Hypothenemus Westwood

Hypothenemus Westwood, 1834, Trans. Ent. Soc. London, vol. 1, p. 34; Erichson, 1836, Wieg. Archiv., vol. 1, p. 61; Eichhoff, 1864, Berl. Ent. Zeitschr., pp. 34, 45, 56; Leconte, 1876, Proc. Amer. Phil. Soc., vol. 15, p. 355; Leconte and Horn, 1883, Coleoptera of North America, p. 517; Gozman, 1885, Rev. d'Ent., vol. 4, p. 278; Eichhoff and Schwarz, 1896, Proc. U.S. Nat. Mus., vol. 18, p. 608; Blandford, 1904, Biol. Centr. Amer., Coleoptera, vol. 4, pt. 6, p. 226; Swaine, 1909, N.Y. State Mus., Bull. 134, p. 116; Hagedorn, 1910, Coleopterorum Catalogus, pars. 4, p. 40; Hagedorn, 1910, Genera Insectorum, fasc. 111, p. 84; Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 12; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 594; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 340; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 82; Costa Lima, 1928, Suppl. Mem. Inst. Oswaldo Cruz, vol. 4, p. 117; Chamberlin, 1939, The Bark and Timber Beetles of North America North

of Mexico, p. 288; Schedl, 1939, Rev. Zool. Bot. Afr., vol. 32, p. 380.

Homoeocryphalus Lindemann, 1876, Bull. Mosc., p. 168; Fauvel, 1884, Rev. d'Ent., vol. 3, p. 315.

Adiaeretus Hagedorn, 1909, Deutsche Ent. Zeitschr., p. 744; Hagedorn, 1910, Coleopterorum Catalogus, pars. 4, p. 47; Hagedorn, 1910, Genera Insectorum, fasc. 111, p. 81; Schedl, 1939, Rev. Zool. Bot. Afr., vol. 32, p. 380.

Cosomoderes, Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 10; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 593; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 340; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 287.

Westwood (1834) erected the monobasic genus Hypothenemus for his species H. eruditus, and described and illustrated a three segmented antennal funicle as the distinguishing feature. Eichhoff (1879) found this character to be erroneous and placed Hypothenemus as a probable synonym of his genus Stephanoderes. Subsequent workers such as Reitter (1894) and Hagedorn (1910a, 1910b) recognized both Hypothenemus and Stephanoderes as distinct, but considered both as subgenera of Cryphalus. Hopkins (1915b) gave both Hypothenemus and Stephanoderes full generic rank and described several related genera.

Following his examination of their type species Fauvel (1884) found Homoeocryphalus to be congeneric with Hypothenemus; after a comparable study, Schedl (1939b) made Adiaeretus a synonym of Hypothenemus. My examination of the antenna of Cosmoderes schwarzi leaves little doubt that Hopkins' concept of the genus Cosmoderes was not that of Eichhoff, and that Hopkins' species belongs to Hypothenemus.

The genus Hypothenemus is very closely allied to Stephanoderes, and in many respects the two genera intergrade. It may be distinguished from allied genera by the four-segmented funicle, the antennal club constricted at the partly septate first suture, the fore tibiae with teeth on only the distal one-fourth, the elytra rather finely striate, and body size smaller. In addition the species of Hypothenemus can be readily distinguished from the smaller species of Stephanoderes by the presence of numerous, short, hair-like, strial and interstrial setae in addition to the uniserial rows of longer scale-like bristles. The smaller North American Stephanoderes have only one row of hair-like strial setae between the rows of bristles. The species of Trischidias are closely allied to Hypothenemus but differ in having the antennal club without a septum, the body very stout, the elytra more coarsely striate, and with the funicle either three-segmented or with a partial fourth segment fused to the club.

Female larger than male, 0.65-1.4 mm. long, 2.34-2.68 times as long as wide; male about 65 per cent as large as the female, 2.2-2.4 times as long as wide; body color light brown to black; vestiture consisting of hair-like and scale-like setae.

Frons broad, usually convex, often with a median groove or elevation, rarely with a transverse elevation; punctures and pubescence usually not prominent. Eye shallowly emarginate; finely granulate; the size reduced in the male one-half to one-third that of the female. Antennal funicle four-segmented in the female, usually three-segmented in the male; segments two, three, and four not increasing in width distally; club elongate, flattened, with three sutures on both sides, the first partly septate, the second and third marked only by setae, smaller and more slender in the male than in the female.

Pronotum 0.85-1.03 times as long as wide; basal margin and posterior one-third of lateral margin with a fine elevated line; asperate in front of summit; one to six teeth on the anterior margin, one or more of these marginal teeth may be absent in the male. Fore tibia with five teeth (rarely four or six) on the distal one-third. Hind tibia slender, with four teeth on the distal margin.

Elytral striae weakly impressed, with rather fine, close, shallow punctures; interstriae usually almost

smooth, with a fine, usually granulate puncture at the base of each elytral bristle; declivity rather steep, convex, and without special prominences or impressions. Vestiture consisting of rows of erect, rather long, interspatial, scale-like bristles; and short, recumbent, hair-like, striae and interstitial setae.

TYPE SPECIES: Hypothenemus eruditus Westwood, monobasic.

Key to the Species of Hypothenemus

1. Anterior margin of pronotum broadly rounded, normally bearing six teeth; usually larger than 1.1 mm. 2

Anterior margin of pronotum narrowly rounded, slightly produced, normally bearing not more than four teeth, the lateral pair reduced in size; usually smaller than 1.1 mm. 7
2. Posterior-lateral areas of pronotum rather deeply, coarsely, closely punctured to lateral margin; pronotum slightly longer than wide, summit in front of middle 3

Posterior-lateral areas of pronotum with punctures shallow, sparse, or absent, particularly near lateral margin; pronotum (except in beameri) distinctly wider than long, with summit at or behind middle 4

3. Posterior-lateral areas of pronotum with smaller, shallow, more widely spaced punctures; mature elytral pubescence white; average size smaller, 1.25 mm.; southern California
 californicus californicus

Posterior-lateral areas of pronotum with larger, closer, deeper punctures; mature elytral pubescence with a slight yellow color; average size slightly larger, 1.35 mm.; southern United States californicus tritici

4. Body slender, usually more than 2.5 times as long as wide; declivital scales slender, more than three times as long as wide 5

Body rather stout, less than 2.4 times as long as wide; declivital scales broad, less than two times as long as wide 6

5. Frons with a broad, subtuberculate elevation above upper level of eyes, the surface coarsely, closely punctured above and to sides of elevation; pronotal teeth larger, the median pair more widely spaced than others; pronotum longer than wide, summit in front of middle; elytral scales more slender, more than five times as long as wide; length 1.2-1.4 mm. beameri

- Frons often with a median elevation or groove, or both, below upper level of eyes, the punctures not as coarse, rather sparse; median pair of pronotal teeth closer, often contiguous; pronotum distinctly wider than long, summit at middle; elytral scales wider, about three to four times as long as wide; length 1.10-1.25 mm.
 eruditus
6. Frons convex, usually with an indistinct median elevation or groove, or both; body stouter; declivital scales wider, less than one and one-half times as long as wide pubescens
- Frons strongly, broadly impressed between eyes forming a prominent, subcarinate, transverse elevation at their upper level; body more slender; declivital scales narrower, about two times as long as wide columbi
7. Anterior margin of pronotum strongly produced into a single spine; striae punctures obscure; declivital scales wider, about two times as long as wide
 miles
- Anterior margin of pronotum bearing four teeth; striae punctures rather deeply impressed; declivital scales narrower, about three times as long as wide ...
 distinctus

Hypothenemus californicus californicus HopkinsHypothenemus californicus Hopkins, 1915, U.S.

Dept. Agr., Rep. No. 99, p. 19; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 294.

Distinguished from its subspecies, H. californicus tritici, by the smaller, more widely spaced punctures and granules on the posterior-lateral areas of the pronotum, the white elytral pubescence, and the distinctive mature body color (dark reddish-brown pronotum and black elytra). These subspecies differ from all other North American Hypothenemus by the distinctly, closely punctured, posterior-lateral areas of the pronotum which extend to the lateral margins.

FEMALE: Length 1.2-1.3 mm., 2.50 times as long as wide, pronotum dark reddish-brown, the elytra black.

Frons convex above, a weak transverse impression below, usually with a rather narrow, often indistinct median elevation extending from upper level of eyes to epistomal margin, frequently with a short rather inconspicuous median groove at its upper end; surface coarsely reticulate, finely, shallowly punctured; pubescence consisting of sparse, fine hair of medium length, inconspicuous except near the epistomal margin. Eye shallowly, narrowly emarginate; finely granulate.

Antennal club as long as scape, 1.46 times as long as wide, the sutures straight, the first suture partly septate.

Pronotum 1.03 times as long as wide; anterior margin with six (often five or seven) large teeth, the lateral ones often slightly larger; each tooth separated from the adjacent ones by a distance at least as great as the basal width of one tooth except the occasionally contiguous median pair; summit anterior to middle; posterior and lateral areas rather finely, shallowly, quite closely punctured, those punctures bearing scale-like setae often granulate; the hair-like pubescence shorter and intermixed on the posterior half with longer, equally abundant, scale-like setae.

Elytra shining; striae weakly impressed, the punctures rather small, shallow, separated by less than their own diameters; interstriae as wide as striae, the punctures small, granulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex. Elytral vestiture consisting of small, recumbent, sparse, hair-like, strial and interstitial setae; and uniserial rows of erect scale-like bristles, each bristle on the declivity about three to four times as long as wide, about one and one-half times as long as the adjacent hair-like setae.

MALE: Similar to the female except: length 0.75-0.85 mm., 2.2 times as long as wide; eye reduced in size, about one-third as large as in female, facets scattered; antennal funicle three-segmented, the club smaller and more slender; one or more marginal teeth of the pronotum usually absent; and pubescence longer and more slender.

TYPE LOCALITY: Pomona, California.

HOSTS: Encelia californica, and Malvastrum sp.

DISTRIBUTION: Southern California. Specimens from the following localities have been examined: Laguna, Pasadena, Pomona, Redondo, and Westwood Hills.

The type specimen of H. californicus is located in the U.S. National Museum.

Specimens of H. californicus californicus and H. c. tritici can be distinguished only by examining rather long series of fully mature specimens; those which are not fully colored can be distinguished only with extreme difficulty, if at all. They evidently are geographical representatives of one species and probably will be found to intergrade when specimens from Mexico are available.

Hypothenemus californicus tritici Hopkins

Hypothenemus tritici Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 19; Chamberlin, 1939, The Bark and

Timber Beetles of North America North of Mexico, p. 295.

Hypothenemus thoracicus Hopkins, 1916, in Blatchley and Leng, Rhynchophora of North Eastern America, p. 598; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 294.

This common and widely distributed subspecies of H. e. californicus is distinguished by the larger, closer, deeper punctures on the posterior-lateral areas of the pronotum; the elytral pubescence with a yellow tint; and the mature body color dark brown to almost black. These two subspecies differ from all other North American Hypothenemus by the distinctly, closely punctured, posterior-lateral areas of the pronotum which extend to the lateral margins.

FEMALE: Length 1.0-1.4 mm., 2.50 times as long as wide, body color dark reddish-brown to black.

Frons convex above, a weak transverse impression below, usually with a rather narrow, often indistinct median elevation extending from upper level of eyes to epistomal margin, frequently with a short rather inconspicuous median groove at upper end of the median elevation; surface coarsely reticulate, finely, shallowly punctured; pubescence consisting of sparse, fine hair of medium length, inconspicuous except near the epistomal margin. Eye shallowly, narrowly emarginate; finely granulate.

Antennal club as long as scape, 1.46 times as long as wide, the sutures straight, the first suture partly septate.

Pronotum 1.03 times as long as wide; anterior margin with six (often five or seven) large teeth, the lateral ones slightly larger in most specimens, each tooth separated from adjacent ones by a distance at least as great as the basal width of one tooth, except the occasionally contiguous median pair; summit anterior to middle; posterior and lateral areas coarsely, closely, deeply punctured, those punctures bearing scale-like setae often granulate; the hair-like pubescence shorter and intermixed on the posterior half with longer, equally abundant, scale-like setae.

Elytra shining; striae weakly impressed, the punctures rather small, shallow, separated by less than their own diameters; interstriae as wide as striae, the punctures small, granulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex. Elytral vestiture consisting of small, recumbent, sparse, hair-like, strial and interstitial setae; and uniserial rows of erect scale-like bristles, each bristle on the declivity about three to four times as long as wide, about one and one-half times as long as the adjacent hair-like setae.

MALE: Similar to the female except: length 0.75-0.85 mm.,

2.2 times as long as wide; eye reduced in size, about one-third as large as in female, the facets scattered; antennal funicle three-segmented, the club smaller and more slender; one or more marginal teeth of the pronotum usually absent; and pubescence longer and more slender.

TYPE LOCALITY: Dallas, Texas.

HOSTS: Aloe vera, Bauhinia alba, Bidens pilosa, Boehmeria scabra, Cajanus cajan, Cappria bifolia, Cinnamomum camphora, Galactia spiciformis, Glycine max (Soy-bean), Ipomoea cathartica, Iva imbricata, Mangifera indica (Mango), Paspalum vaginatum, Philibertella clausa, Poinsettia heterophylla, Quisqualis indica, Salix babylonica, Sida rhombifolia, Triticum aestivum (Wheat), Uniola paniculata, Verbena sp., Waltheria americana, and Yucca spp.

DISTRIBUTION: The United States south and east of a line from Brownsville, Texas, through south eastern Kansas, to Washington, D.C.. Specimens from the following localities have been examined. DISTRICT OF COLUMBIA: Washington.

FLORIDA: Homestead, Key Largo, Key Vaca, Key West, Long Key, Matacumba Key, Perrine, and Plantation Key. KANSAS: Wellington. KENTUCKY: Fulton, TEXAS: Boca Chica, Dallas, and Port Arthur. SOUTH CAROLINA: Charleston, Isle of Palms, and Pawleys Beach. VIRGINIA: Lynchburg.

The type specimens of H. tritici and H. thoracicus are located in the U.S. National Museum.

Hypothenemus beameri, new species

This species is perhaps more closely allied to H. eruditus than to any other North American species, but differs from this and other species of the genus by the coarsely, closely, deeply punctured frons, the median elevation above the upper level of the eyes, the arrangement of marginal teeth on the pronotum, and the very slender elytral bristles.

FEMALE: Length 1.2-1.4 mm., 2.64 times as long as wide, body color dark brown to almost black.

Frons convex, with a rather broad, subtuberculate, low, median elevation just above upper level of eyes, a rather inconspicuous median ridge continuing from elevation to epistoma; surface coarsely reticulate, punctures coarse, close, deep, except along the median ridge and epistoma; pubescence consisting of sparse, fine hair of medium length, inconspicuous except near the epistomal margin. Eye shallowly, narrowly emarginate; finely granulate. Antennal club longer than scape, 1.46 times as long as wide, the sutures straight, the first suture partly septate.

Pronotum 1.03 times as long as wide; anterior margin with six rather large teeth of equal size, each

separated from adjacent ones by a distance at least as great as the basal width of one tooth, except the more widely separated median pair; summit anterior to middle; posterior and lateral areas finely, closely granulate; the hair-like pubescence shorter and intermixed on the posterior half with longer, equally abundant, scale-like setae; a granule at the base of each scale.

Elytra shining; striae weakly impressed, the punctures rather small, shallow, separated by less than their own diameters; interstriae about as wide as striae, the punctures small, granulate, evenly, quite closely spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex. Elytral vestiture consisting of small, recumbent, sparse, hair-like, strial setae; and uniserial rows of erect, scale-like bristles, each bristle on the declivity about five times as long as wide, about two times as long as the adjacent hair-like setae.

MALE: Similar to the female except: length 0.75-0.95 mm., 2.42 times as long as wide; eye reduced in size, about one-half as large as in female; antennal funicle three-segmented, the club smaller and more slender; one or more marginal teeth of the pronotum may be absent; and pubescence slightly longer.

TYPE LOCALITY: Homestead, Florida.

HOSTS: Annona sp., Bidens pilosa, Cappris bifolia,
Cajanus cajan, Ichthyomethia communis, Iva imbricata,
Mangifera indica (Mango), Parmentiera edulis, Persea
americana (Avocado), Philibertella clausa, Poinsettia
heterophylla, Sida rhombifolia, and Waltheria americana.

DISTRIBUTION: Southern Florida, from Homestead to Key West. The female holotype, male allotype, and 19 paratypes were collected June 22. In addition 57 paratypes were collected as follows: Everglades National Park, July 6; Key Largo, June 25; Key West, July 3; Long Key, June 27; Matacumba Key, June 28; and Plantation Key, June 28; all were collected in 1951 by R. D. Price, R. H. and L. D. Beamer, and S. L. Wood.

The holotype, allotype, and 12 paratypes are located in the Snow Entomological Collections; additional paratypes are in the collections of the U.S. National Museum, T. O. Thatcher, and the author.

Hypothenemus eruditus Westwood

Hypothenemus eruditus Westwood, 1836, Trans. Ent. Soc. London, vol. 2, p. 34; Erichson, 1836, Archiv f. Naturgesch., vol. 2, p. 61; Scudder, 1865, Proc. Bost. Soc. Nat. Hist., vol. 10, pp. 13-14; Ferrari, 1867, Die Forst und Baumzuchtschädlichen Borkenkäfer, p. 7; Eichhoff, 1879, Ratio ... Tomicinorum, p. 165; Sharp, 1879, Trans.

Ent. Soc. London, p. 102; Fauvel, 1884, Rev. d'Ent., vol. 3, pp. 315, 390; Hubbard, 1887, Ins. Orange, vol. 14, p. 173; Hamilton, 1889, Trans. Amer. Ent. Soc., vol. 16, p. 158; Schwarz, 1889, Proc. Ent. Soc. Wash., vol. 1, p. 139; Smith, 1890, Ent. Amer., vol. 6, p. 54; Schwarz, 1891, Proc. Ent. Soc. Wash., vol. 2, p. 74; Chittenden, 1893, Ins. Life, vol. 5, p. 250; Hopkins, 1893, W. Va. Agr. Exp. Sta., Bull. 31, p. 132; Blandford, 1894, Ins. Life, vol. 6, pp. 261-263; Reitter, 1894, Verh. Naturf. Vereines Brünn, vol. 33, p. 75; Hamilton, 1894, Trans. Amer. Ent. Soc., vol. 21, p. 406; Hamilton, 1895, Trans. Amer. Ent. Soc., vol. 22, pp. 346, 378; Eichhoff and Schwarz, 1896, Proc. U.S. Nat. Mus., vol. 18, p. 608; Lintner, 1896, 11th N.Y. Report, p. 270; Smith, 1900, Catalogue of the Insects of New Jersey, p. 362; Blandford, 1904, Biol. Centr. Amer., Coleoptera, vol. 4, pt. 6, pp. 229, 230; Currie, 1905, U.S. Dept. Agr., Bull. 53, pp. 7, 13; Newbery, 1910, Ent. Mag., vol. 46, p. 83; Schedl, 1940, An. Esc. Nac. Cienc. Biol. (Mexico), vol. 1, p. 342.

Bostrichus arecae Hornung, 1842, Stett. Ent. Zeit., vol. 3, p. 117; Eichhoff, 1879, Ratio ... Tomieinorum, pp. 165, 166.

Bostrichus boieldieui Ferroud, 1864, Ann. Soc. Linn. Lyon, p. 188.

Hypothenemus pruni Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 16; Blatchley and Leng, 1916, Rhynchophora

of North Eastern America, p. 597; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 294.

Hypothenemus rumseyi Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 16; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 597; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 85; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 290.

Hypothenemus asiminae Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 16; Blatchley and Leng, 1915, Rhynchophora of North Eastern America, p. 597; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 291.

Hypothenemus hamamelidis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 16; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 597; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 294.

Hypothenemus punctifrons Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 18; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 598; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 86; Dodge, 1938, Minn. Agr. Exp. Sta., Tech. Bull. 132, p. 39; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 291.

Hypothenemus subelongatus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 19; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 295.

Hypothenemus nigripennis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 19; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 598; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 86; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 291.

Stephanoderes evonymi Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 26; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 600; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 303.

Hypothenemus germari, Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 83; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 290.

Hypothenemus juglandis Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 88; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 292.

Hypothenemus citri Ebling, 1935, Pan.-Pacif. Ent., vol. 11, p. 21; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 289.

This is the most common and widely distributed North American species of Hypothenus; it is variable, different clones (?) from a given locality sometimes differing sharply. It is rather closely allied to H. pubescens, but has a more slender body form, and longer more slender elytral scales; it is also similar to H. beameri, but lacks the short transverse frontal elevation at the upper level of the eyes, and has less distinctly punctured lateral areas of the pronotum and smaller body size. The convex frons, presence of six marginal teeth on the pronotum, and the narrow elytral scales aid in separating it from other species of this genus.

FEMALE: Length 1.10-1.25 mm., 2.35-2.65 times as long as wide, body color dark brown to almost black.

Frons convex above, a weak transverse impression above the epistomal margin, usually with either a rather narrow indistinct, median elevation of variable length between upper level of eyes and epistomal margin, or with a narrow, often indistinct median groove, or with a combination of both; surface coarsely reticulate, and with punctures varying from fine and obscure to rather coarse and deep; pubescence consisting of sparse, fine hair of medium length, inconspicuous except near epistomal margin. Eye sinuate to shallowly emarginate; finely granulate. Antennal club at least as long as scape, 1.43 times as long as wide, the sutures straight, the first suture partly septate.

Pronotum 0.85-0.95 times as long as wide; anterior margin with six (often five or seven) teeth of equal size, each tooth separated from the adjacent ones by a distance at least as great as the basal width of one tooth except the occasionally contiguous median pair; summit at middle; posterior-lateral areas coarsely reticulate, sparsely granulate and usually with a few rather small, shallow punctures, rather coarsely granulate-punctate behind summit; the hair-like pubescence shorter and intermixed on posterior half with longer, equally abundant scale-like setae.

Elytra shining; striae weakly impressed, the punctures rather small, shallow, separated by less than their own diameters; interstriae as wide as striae, the punctures small, granulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex. Elytral vestiture consisting of small, recumbent, sparse, hair-like strial and interstitial setae; and uniserial rows of erect scale-like bristles, each bristle on the declivity about three to four times as long as wide, about one and one-half times as long as the adjacent hair-like setae.

MALE: Similar to the female except: length 0.70-0.80 mm., 2.2 times as long as wide; eye reduced in size, about one-half as large as in female; antennal funicle three-segmented, the club smaller and more slender; one or more marginal

teeth of pronotum usually absent; and pubescence usually longer and more slender.

TYPE LOCALITY: According to Blandford (1904, p. 229) this species was first collected in "England, burrowing in the cover of a book of unknown antecedents."

HOSTS: Abrus precatorius, Adenanthera pavonina, Aesculus sp., Abutilon mollissimum, Albizzia lebbekoides, Aloe vera, Annona sp., Asimina triloba, Bauhinia grandiceps, Berria amonilla, Bidens pilosa, Boehmeria scabra, Bucida buceras, Cajanus cajan, Carya spp., Celtis laevigata, Cinnamomum camphora, Coccolobis laurifolia, Cornus sp., Elaeagnus pungens fruitlandi, Erythrina sp., Ficus aurea, Galactia spiciformis, Helianthus sp., Hibiscus rosa-sinensis, Ichthyomethia communis, Ipomoea cathartica, Juglans nigra, Liquidambar styraciflua, Magnolia sp., Mangifera indica (Mango), Morus spp., Nyssa sylvatica, Parmentiera edulis, Paspalum vaginatum, Pasiflora latifolia, P. multiflora, Persea americana (Avocado), Phalocarpus septentrionis, Philibertella clausa, Phragmites communis, Prunus sp., Quisqualis indica, Rhizophora mangle, Ricinus communis, Sambucus canadensis, Sida rhombifolia, Smilax sp., Tectona grandis, Trema floridana, Triopteria jamaicensis, Urena sp., Verbesina laciniata, Wisteria sp., and Yucca spp.

DISTRIBUTION: In the United States south and east of a line from southern Texas, through southern Michigan, to New

Jersey; and from southern California. Specimens from the following localities have been examined. CALIFORNIA: Carlsbad, Coronado, Los Angeles, and Orange. DISTRICT OF COLUMBIA: Washington. FLORIDA: Dade City, Everglades National Park, Homestead, Key Largo, Key West, Long Key, Missouri Key, Monticello, Oleno State Park, Perrine, Plantation Key, Royal Palm Hammock State Park, Sebring, and Sugar Loaf Key. GEORGIA: Richmond Hill, and Savannah. ILLINOIS: East St. Louis, and Lawrenceville. LOUISIANA: Boothville, Covington, Greole, Greenwell Springs, Krotz Springs, and Tallulah. MARYLAND: College Park, and Plumers Island. MICHIGAN: Jackson County. MISSISSIPPI: Agricultural College, Gall, Meridian, Natchez, Nicholson, Picayune, Port Gibson, and Starkville. NEW JERSEY: Trenton. NORTH CAROLINA: Cherokee, and Tryon. PENNSYLVANIA: Chambersburg, Lansdowne, and West Park. SOUTH CAROLINA: Awendaw, Charleston, Clemson, and Mount Pleasant. TENNESSEE: Gatlinburg. TEXAS: Boca Chica, Brownsville, Karns City, and Victoria. WEST VIRGINIA: Knoxville, and Little Falls.

The type specimens of H. pruni, H. rumseyi, H. asiminae, H. hamamelidis, H. punctifrons, H. subelongatus, H. nigripennis, H. pubescens, Stephanoderes evonymi, and H. juglandis are located in the U.S. National Museum. The type of H. citri is located in the Museum of the California Academy of Sciences.

Hypothenemus pubescens Hopkins

Hypothenemus pubescens Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 19; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 598; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 295.

The stouter body form, and the shorter, broad, elytral scales distinguish this species from the allied H. eruditus. The absence of a frontal elevation, the presence of six marginal teeth on the pronotum (the median pair sometimes reduced or absent), the broad elytral scales, and the small body size distinguish this species from others of the genus.

FEMALE: Length 1.0-1.1 mm., 2.34 times as long as wide, body color light yellowish-brown.

Frons convex above, a weak transverse impression below, usually with a rather narrow, often indistinct, median elevation extending from upper level of eyes to epistomal margin, frequently with a short rather inconspicuous median groove at its upper end; surface coarsely reticulate, finely, shallowly punctured; pubescence consisting of sparse, fine hair of medium length, inconspicuous except near epistomal margin. Eye sinuate; finely granulate. Antennal club as long as scape, 1.42 times as long as

wide, the sutures straight, the first suture partly septate.

Pronotum 0.9 $\frac{1}{4}$ times as long as wide; anterior margin usually with six (often four or five) teeth, the median pair reduced in size, the lateral pair more widely spaced, the distance about equal to the width of one tooth; summit at middle; posterior and lateral areas reticulate with scattered granulate punctures, the granules not more abundant behind summit; the hair-like pubescence shorter and intermixed on posterior half with longer, equally abundant, scale-like setae.

Elytra rather dull; striae not impressed, the punctures fine, shallow, separated by less than their own diameters; interstriae slightly wider than striae, the punctures small, subgranulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity steep, convex. Elytral vestiture consisting of small, inconspicuous, recumbent, hair-like, strial setae; and uniserial rows of erect, broad, scale-like, interstitial bristles, each bristle on the declivity one to one and one-half times as long as wide, about twice as long as the adjacent hair-like setae.

MALE: Similar to the female except: length 0.80 mm., 2.2 times as long as wide; eye reduced in size, about one-half as large as in female; antennal funicle three-segmented, the club smaller and more slender; the median pair of marginal

teeth on the pronotum absent; pubescence longer and more slender. Only one male observed.

TYPE LOCALITY: Key West, Florida.

HOST: Paspalum vaginatum.

DISTRIBUTION: Known only from Key Vaca, Missouri Key, and Key West, Florida.

Hypothenemus columbi Hopkins

Hypothenemus columbi Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 18; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 294.

Hypothenemus abdominalis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 18.

Hypothenemus rufopalliatus Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 18; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 598; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 294.

Hypothenemus brunneipennis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 18.

Hypothenemus amplipennis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 19.

This species is readily distinguished from all other North American representatives of the genus by the

prominent transverse frontal elevation below which is a rather deep transverse impression, the presence of six teeth on the broadly rounded anterior margin of the pronotum, and the rather broad elytral scales. It is not closely allied to any other species considered here.

FEMALE: Length 1.05-1.25 mm., 2.42 times as long as wide, body color dark brown.

Frons deeply, transversely impressed between eyes and above epistoma, producing a prominent, subcarinate elevation at upper level of eyes, the elevation as long as one-half of distance between eyes; surface above and to sides of impression coarsely reticulate and coarsely, closely, deeply punctured, the impression almost smooth except for a few minute, shallow punctures; pubescence consisting of sparse, fine hair of medium length, inconspicuous except near the epistomal margin. Eye very shallowly emarginate; finely granulate. Antennal club about as long as scape, 1.48 times as long as wide, the sutures straight, the first suture partly septate.

Pronotum 0.94 times as long as wide; anterior margin with six rather small teeth, the lateral pair slightly smaller, each tooth separated from adjacent ones by a distance about equal to the basal width of one tooth; summit at middle; posterior and lateral areas granulate-punctate, particularly on the dorsal half; the hair-like pubescence longer and more abundant anteriorly, shorter and

intermixed on the posterior half with longer, equally abundant, scale-like setae.

Elytra shining; striae weakly impressed, the punctures distinct, rather small and shallow, separated by less than their own diameters; interstriae as wide as striae, the punctures small, granulate, in uniserial rows, each bearing an erect scale-like bristle or a shorter recumbent hair. Declivity steep, convex. Elytral vestiture consisting of small, recumbent, sparse, hair-like, strial and interstitial setae; and uniserial rows of erect, scale-like interstitial bristles, each bristle on the declivity about one and one-half to two times as long as wide, very slightly longer than the adjacent hair-like setae.

MALE: Similar to the female except: length 0.81 mm., 2.40 times as long as wide; eye reduced in size, about one-half as large as in female; antennal funicle three-segmented, the club smaller and more slender; one or more marginal teeth of the pronotum may be absent; and pubescence slightly longer and more slender.

TYPE LOCALITY: Columbus, Texas.

HOSTS: Bauhinia alba, Citrus aurantifolia (Lime), Carica papaya (Papaya), Ficus sp., Ichthyomethia communis, Quercus sp., and Salix sp.

DISTRIBUTION: The Gulf coast from Brownsville, Texas, to

Homestead, Florida; and Cuba. Specimens from the following localities have been examined. FLORIDA: Everglades National Park, Homestead, and Ferrine. LOUISIANA: Creole. MISSISSIPPI: Nicholson. SOUTH CAROLINA: Mount Pleasant. TEXAS: Brownsville, and Columbus. CUBA: Cayamas.

The type specimens of H. columbi, H. abdominalis, H. rufopalliatus, H. brunneipennis, and H. amplipennis are located in the U.S. National Museum.

Hypothenemus miles (Leconte)

Cryphalus miles Leconte, 1878, Proc. Amer. Phil. Soc., vol. 17, p. 433; Schwarz, 1878, Proc. Amer. Phil. Soc., vol. 17, p. 468.

Hypothenemus miles, Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 13; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 596; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 283.

This unique species differs from all other North American representatives of the genus by the single, median, horn-like prominence on the anterior margin of the pronotum, the more slender body form, and the obscure elytral striae.

FEMALE: Length 1.05-1.15 mm., 2.68 times as long as wide, body color dark brown to piceous.

Frons convex, weakly impressed above the epistoma, with an indistinct, broad, median elevation extending from

upper level of eyes to epistomal margin; surface rather coarsely reticulate, distinctly, rather sparsely punctured; pubescence consisting of fine, sparse, long, rather conspicuous hair. Eye weakly sinuate; finely granulate. Antennal club about as long as scape, 1.54 times as long as wide, the sutures straight, the first suture partly septate.

Pronotum of about equal length and width; anterior margin medially produced into a single prominent horn-like spine; summit obscure, near middle; posterior and lateral areas with scattered, subgranulate punctures of moderate size, each granule located at the base of a scale-like seta; the hair-like pubescence short, slightly longer anteriorly, intermixed on the posterior half with longer, equally abundant, broad, scale-like setae.

Elytra shining; striae obscure, the punctures fine, shallow, separated by a distance greater than their own diameters; interstriae wider than striae, the punctures fine, granulate, widely spaced, in uniserial rows, each puncture bearing an erect scale-like bristle. Declivity moderately steep, convex. Elytral vestiture consisting of small, recumbent, sparse, hair-like, strial and inter-strial setae; and uniserial rows of erect scale-like bristles, each bristle on the declivity about two times as long as wide, about one and one-half times as long as the adjacent hair-like setae.

MALE: Unknown.

HOST: Pinus sp.

DISTRIBUTION: The only specimens examined were from Tampa, Florida, and St. Catherine's Island, Georgia.

The type specimen of Cryphalus miles is located in the Museum of Comparative Zoology; however, at the time of my visit both specimens (the first from Tampa, Florida; the second from Columbus, Texas) in Leconte's series were missing from their pins. Dr. Darlington recovered a specimen of H. distinctus from the floor of the box; presumably it was the Columbus, Texas, specimen. Additional specimens from Tampa, Florida, are in the U.S. National Museum.

Hypothenemus distinctus, new species

The more slender body form, deeper strial punctures, and more slender elytral bristles distinguish this species from the similar Trischidias atoma. The combination of the slightly produced anterior margin of the pronotum with four marginal teeth, the slender body size, the coarse strial punctures, and the slender elytral bristles is unique among the North American representatives of the genus.

FEMALE: Length 0.9 mm., 2.45 times as long as wide, mature body color dark brown (the teneral type specimen is yellow).

Frons convex, a weak transverse impression just above the epistoma; a narrow median impression extending from upper level of eyes about one-fourth of the distance to epistomal margin; surface rather coarsely reticulate, and with a few minute, inconspicuous punctures; pubescence scarcely evident, consisting of a few fine hairs of medium length. Eye entire; finely granulate. Antennal club about as long as scape, about 1.50 times as long as wide, the sutures almost straight.

Pronotum 0.97 times as long as wide; anterior margin slightly produced, with four subcontiguous teeth, the median pair distinctly larger; summit at middle; posterior and lateral areas smooth, shining, a few shallow punctures posteriorly, a few granules near asperate area; the hair-like pubescence shorter and intermixed on posterior half with longer, sparse, scale-like setae.

Elytra shining; striae slightly impressed, the punctures rather coarse, deep, separated by a distance less than their own diameters; interstriae narrower than striae, the punctures fine, rather coarsely granulate, evenly, widely spaced in uniserial rows, each puncture bearing an erect bristle. Declivity moderately steep, convex. Elytral vestiture consisting of minute, recumbent, hair-like, strial and interstitial setae; and uniserial rows of erect scale-like bristles, each bristle on the declivity about three times as long as wide.

MALE: Unknown.

TYPE LOCALITY: Union, Missouri.

HOST: Rhus aromatica.

DISTRIBUTION: The teneral female holotype and one mature female paratype (with the head missing) were collected July 26, 1951, by R. D. Price, R. H. and L. D. Beamer, and S. L. Wood. The holotype is located in the Snow Entomological Collections; the paratype is in the author's collection. A second paratype of uncertain origin is in the Museum of Comparative Zoology (see H. miles).

Hypothenemus schwarzi (Hopkins)

Cosmoderes schwarzi Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 11; Blatchley and Leng, 1916, Rhyncho-
phora of North Eastern America, p. 593; Chamberlin, 1939,
The Bark and Timber Beetles of North America North of
Mexico, p. 287.

This species is known only from a balsam mount of the antenna of the type specimen. It is clear from the slide and from Hopkins' (1915b, Fig. 1) illustration that the funicle is composed of four segments, although only three are mentioned in the original description. Since the first suture of the club is partly septate and the funicle is four-segmented, and because the body size is very small

(1.0 mm.), it is quite clear that this species belongs to the genus Hypothenemus. However, the small size, slender body form, presence of four marginal teeth on the pronotum, and the increase in width distally of the funicular segments suggest that this is a species not at present recognized as occurring in Florida, possibly near or synonymous with H. distinctus.

TYPE LOCALITY: Haw Creek, Florida.

Trischidias Hopkins

Trischidias Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 12; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 594; Leng, 1920, Catalogue of the Coleoptera of America North of Mexico, p. 339; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 287.

Hopkins (1915) erected the genus Trischidias for a single specimen collected at Brunswick, Georgia. The status of this genus is open to question; however, at present Trischidias may be distinguished from Hypothenemus on the basis of the large, non-septate antennal club and the stout body form, even though the funicle is not always three-segmented. In addition to Hopkins' T. georgiae, Hypothenemus atoma and T. minutissima also belong to this genus.

Female larger than the male, 0.65-1.10 mm. long, 2.0-2.3 times as long as wide; male about 60 per cent as large as the female; body color light brown to black; vestiture consisting of hair-like and scale-like setae.

Frons broad, usually convex, often with a median groove; punctures and pubescence usually not prominent. Eye entire; finely granulate; reduced in the male to about one-third the size of that of the female. Antennal funicle three-segmented in the female, often with a partial fourth segment almost completely fused to the club (the type of T. georgiae has only three segments as do occasional specimens of T. atoma and most specimens of T. minutissima; the line of fusion between the fourth segment and the club is usually visible); segment one longer than the combined length of segments two and three; segments two and three of equal width; club rather large, ovate, the sides not constricted, three sutures indicated by rows of setae, no indication of a septum.

Pronotum 0.82-0.91 times as long as wide; basal and the posterior one-third of lateral margin with a fine elevated line; asperate in front of summit, with two to four teeth on anterior margin.

Elytral striae rather weakly impressed, with rather coarse, close, deep punctures; interstriae with a row of punctures, usually subgranulate, each giving rise to an elytral bristle; declivity rather steep, convex,

without special prominences or impressions; vestiture consisting of rows of erect, rather long, interspatial scale-like bristles, and short, recumbent, strial and interstitial hair-like setae.

TYPE SPECIES: Trischidias georgiae Hopkins, monobasic.

Key to the Species of Trischidias

1. Body 2.3 times as long as wide; anterior margin of pronotum normally with four teeth; elytral striae less coarsely punctured; interstriae wider than striae; body and scale color lighter atoma

Body stouter, 2.0 times as long as wide; anterior margin of pronotum normally with two teeth; elytral striae more coarsely punctured; interstriae narrower than striae; body and scale color darker 2
2. Strial punctures not increasing in size posteriorly; declivital interspaces about as wide as on disc, the strial punctures about as large as on disc; length 0.65-0.80 mm. minutissima

Strial punctures increasing conspicuously in size posteriorly; declivital interspaces less than one-half as wide as striae, the strial punctures larger than on disc; length 1.1 mm. georgiae

Trischidias atoma (Hopkins)

Hypothenemus atomis Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 15; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 596; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 293.

Hypothenemus impressifrons Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 15; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 596; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 293.

Hypothenemus marylandicae Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 15; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 596; Blackman, 1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 83; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 292.

Hypothenemus robiniae Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 15; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 597; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 293.

Hypothenemus toxicodendri Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 15; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 597; Blackman,

1922, Miss. Agr. Exp. Sta., Tech. Bull. 11, p. 83;
Chamberlin, 1939, The Bark and Timber Beetles of North
America North of Mexico, p. 290.

The more slender body form, presence of four
marginal teeth on the pronotum, less coarsely punctured
elytral striae, wider interspaces, and lighter body and
scale color distinguish this species from the allied
T. minutissima and T. georgiae.

FEMALE: Length 0.75-1.00 mm., 2.32 times as long as wide,
body color dark brown.

Frons convex, a weak transverse impression just
above the epistoma, a median impression of variable depth
and length extending from upper level of eyes toward
epistoma; surface coarsely reticulate and with a few minute,
inconspicuous punctures; pubescence scarcely evident, consist-
ing of a few fine hairs of medium length. Eye entire; finely
granulate. Antennal club large, longer than scape, 1.28
times as long as wide, the sutures straight.

Pronotum 0.91 times as long as wide; anterior
margin slightly produced, with four subcontiguous teeth
(rarely five or six), the median pair distinctly larger;
summit at middle; posterior and lateral areas coarsely
reticulate, with a few scattered granules; the hair-like
pubescence shorter and intermixed on the posterior half with
longer, equally abundant, scale-like setae.

Elytra shining; striae slightly impressed, the punctures fine, distinct, rather shallow, separated by a distance equal to their own diameters; interstriae wider than striae, the punctures small, rather coarsely granulate, evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity moderately steep, convex. Elytral vestiture consisting of minute, recumbent, hair-like, strial setae; and uniserial rows of broad, erect, scale-like, interstitial bristles, each bristle on the declivity one to one and one-half times as long as wide.

MALE: The only male observed was similar to the female except: length 0.53 mm., body stouter (damaged, could not be measured); eye reduced in size, about one-half as large as in female; antennal funicle three-segmented, the club smaller and more slender; and pubescence slightly longer.

TYPE LOCALITY: Morgantown, West Virginia.

HOSTS: Acer rubrum, Asimina triloba, Carya spp., Castanea dentata, Quercus marylandica, Rhododendron sp., Rhus toxicodendron, Robinia sp., R. pseudo-acacia, Salix sp., S. nigra, and Ulmus americana.

DISTRIBUTION: The United States south and east of a line from Covington, Louisiana, through Lawrence, Kansas, to Maryland. Specimens from the following localities have been examined. FLORIDA: Sebring. KANSAS: Lawrence. LOUISIANA:

Covington. MARYLAND: Chevy Chase. MISSISSIPPI: Trimcane Swamp, and Vicksburg. NORTH CAROLINA: Cherokee, and Tryon. TENNESSEE: Gatlinburg. WEST VIRGINIA: Morgantown.

The type specimens of H. atomis, H. impressifrons, H. marylandicae, H. robiniae, and H. toxicodendri are located in the U.S. National Museum.

Trischidias minutissima, new species

The stouter body form, presence of two (rarely four) marginal teeth on the pronotum, the more coarsely punctured elytral striae, narrower interstriae, and darker body and scale color distinguish the female of this species from that of T. atoma. It is more closely allied to T. georgiae, but differs by the smaller body size, the striae punctures do not increase conspicuously in size posteriorly, and the marginal teeth on the pronotum subcontiguous.

FEMALE: Length 0.65-0.80 mm., 2.00 times as long as wide, body color black, the scales dusky.

Frons convex, a weak transverse impression just above epistoma; a narrow median impression of variable depth and length extending from upper level of eyes toward epistoma; surface coarsely reticulate, a few minute, inconspicuous punctures; pubescence scarcely evident, consisting of a few fine hairs of medium length. Eye entire; finely granulate. Antennal club large, longer than scape,

1.18 times as long as wide, the sutures straight.

Pronotum 0.82 times as long as wide; anterior margin slightly produced, with two subcontiguous teeth, rarely with an additional pair of small granules lateral to the teeth; summit at middle; posterior and lateral areas coarsely reticulate, with a few scattered granules; the hair-like pubescence shorter and intermixed on the posterior half with longer, equally abundant scale-like setae.

Elytra shining; striae slightly impressed, the punctures rather large, deep, separated by a distance equal to their own diameters; interstriae distinctly narrower than the striae, the punctures small, evenly spaced in uniserial rows, each coarse, granulate, and bearing an erect scale-like bristle. Declivity moderately steep, convex. Elytral vestiture consisting of minute, recumbent, hair-like, strial setae; and uniserial rows of dark colored, broad, erect, scale-like, interstitial bristles, each bristle on the declivity one to one and one-half times as long as wide.

MALE: Unknown.

TYPE LOCALITY: Sugar Loaf Key, Florida.

HOST: Rhizophora mangle.

DISTRIBUTION: The female holotype and 59 paratypes were collected July 3, 1951, by R. D. Price, R. H. and L. D. Beamer, and S. L. Wood, from fungus (?) pustules just under the surface of the bark of a broken root.

The holotype and 12 paratypes are located in the Snow Entomological Collections; additional paratypes are in the collections of the U.S. National Museum, and the author.

Trischidias georgiae Hopkins

Trischidias georgiae Hopkins, 1915, U.S. Dept. Agr., Rep. No. 99, p. 12; Blatchley and Leng, 1916, Rhynchophora of North Eastern America, p. 594; Chamberlin, 1939, The Bark and Timber Beetles of North America North of Mexico, p. 287.

This species is more closely allied to T. minutissima than to any other known species; it differs by the larger size, the striae punctures increase in size posteriorly, and the teeth on the anterior margin of the pronotum smaller and more widely separated.

FEMALE: Length 1.1 mm., about 2.00 times as long as wide, body color black.

Frons convex, a weak transverse impression just above epistoma, a short, shallow, median impression between

the eyes; surface rather coarsely reticulate, with a few minute, inconspicuous punctures; pubescence scarcely evident, consisting of a few fine hairs of medium length. Eye entire; finely granulate. Antennal club large, longer than scape.

Pronotum with the anterior margin slightly produced, with two teeth separated by the basal width of one tooth; summit at middle; posterior and lateral areas coarsely reticulate, with a few scattered granules; the hair-like pubescence shorter and intermixed on the posterior half with longer, equally abundant, scale-like setae.

Elytra shining; striae slightly impressed, the punctures rather large, deep, separated by a distance equal to one-half their own diameters, becoming larger and closer toward the declivity; interstriae distinctly narrower than striae, the punctures small, rather coarsely granulate and evenly spaced in uniserial rows, each bearing an erect scale-like bristle. Declivity moderately steep, convex; striae punctures very coarse, deep, separated by less than one-half their own diameters; the interstriae narrow, about one-half as wide as striae. Elytral vestiture consisting of minute, recumbent, hair-like, striae setae; and uniserial rows of rather dark colored, broad, erect scale-like interstitial bristles, each bristle on the declivity one to one and one-half times as long as wide.

TYPE LOCALITY: Brunswick, Georgia.

HOST: Unknown.

DISTRIBUTION: Known only from the unique type.

SPECIES OMITTED

Plesiophthorus striatus (Leconte)

This species was described in the genus Cryphalus, then later transferred by Leconte to Hypothenemus where it remained until the present time. The type of C. striatus was examined and found to belong to the genus Plesiophthorus Schedl. It is of the same size and proportions as P. californicus, but has a transverse elevation similar to that of P. luteolus.

Cis terminalis (Mannerheim)

Examination of the type specimen of Bostrichus terminalis Mannerheim by Mr. G. Stenius, at Helsinki, has shown this species to belong to the genus Cis of the family Cisidae, not to the genus Cryphalus in which it was treated by Swaine (1918, p. 89).

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PLATE I

Figs. 1-4. Outline drawings of Stephanoderes dissimilis, illustrating tribal characteristics, as follows: 1, lateral aspect of a female; 2, dorsal aspect of a female; 3, lateral aspect of a male; 4, dorsal aspect of a male.

Fig. 5. Outline drawing of the posterior parts of Pseudopityophthorus pubipennis, comparing tribal characters.

Figs. 6-11. The antennal club of representatives of the North American genera of Cryphalini (females) as follows: 6, anterior face, and 7, posterior face of Procryphalus utahensis; 8, anterior face, and 9, posterior face of Cryphalus populi; 10, anterior face, and 11, posterior face of Cryphalomorphus floridensis.

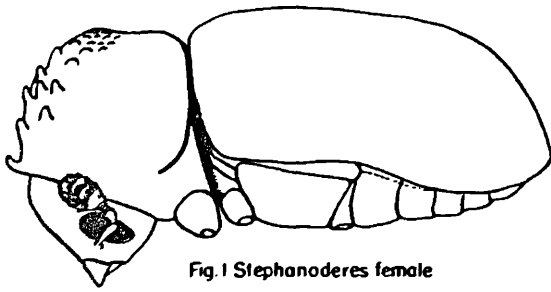


Fig. 1 *Stephanoderes* female

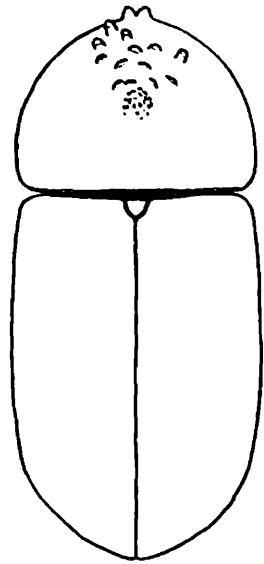


Fig. 2 *Stephanoderes* female

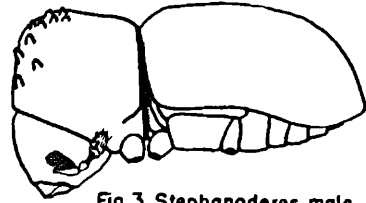


Fig. 3 *Stephanoderes* male

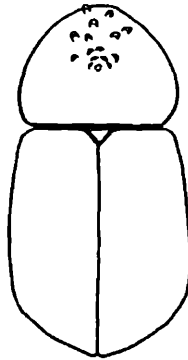


Fig. 4 *Stephanoderes* male

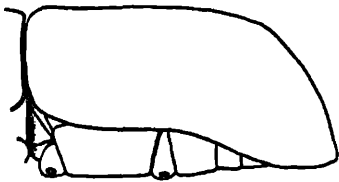


Fig. 5 *Pityophthorini*

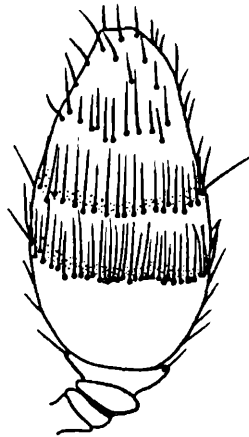


Fig. 8 *Cryphalus*

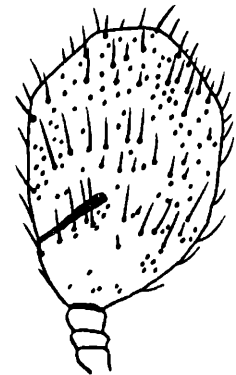


Fig. 10 *Cryphalomorphus*

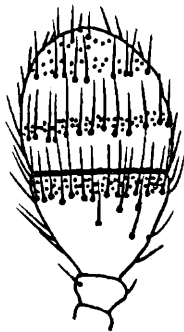


Fig. 6 *Procryphalus*



Fig. 7 *Procryphalus*

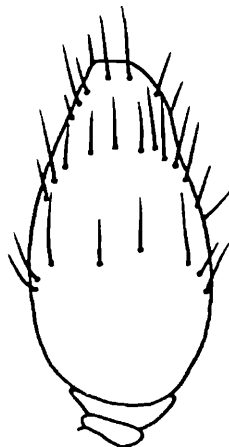


Fig. 9 *Cryphalus*

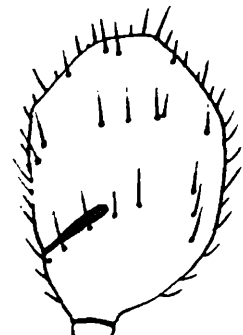


Fig. 11 *Cryphalomorphus*

PLATE II

Figs. 12-24. The antennal club of representatives of the North American genera of Cryphalini (females) as follows: 12, anterior face, and 13, posterior face of Taenioglyptes pubescens; 14, anterior face, and 15, posterior face of Hypocryphalus mangiferae; 16, anterior face, and 17, posterior face of Cryptocarenum porosus; 18, anterior face, and 19, posterior face of Hypothenemus eruditus; 20, anterior face of Trischidias minutissima; 21, antennal funicle of Stephanoderes castaneus; 22, anterior face of female, 23, posterior face of female, and 24, anterior face of male Stephanoderes dissimilis.

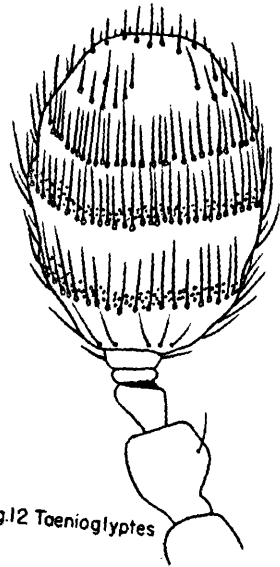


Fig. 12 Taenioglyptes

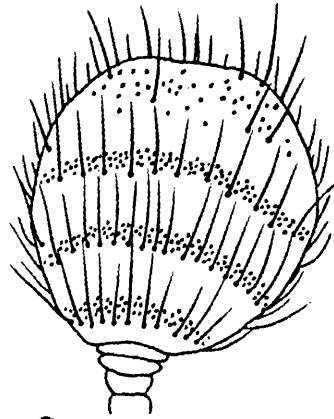


Fig. 14 Hypocryphalus

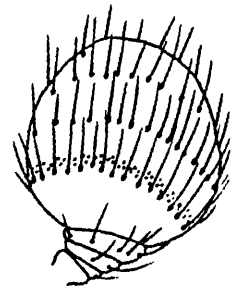


Fig. 16 Cryptocorenus

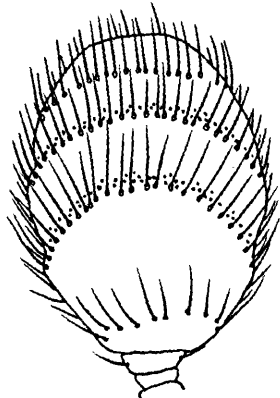


Fig. 13 Taenioglyptes

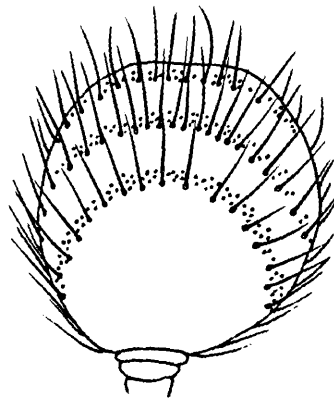


Fig. 15 Hypocryphalus

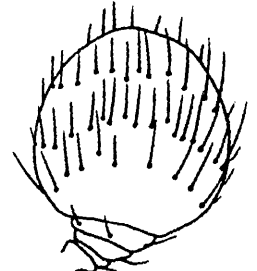


Fig. 17 Cryptocorenus

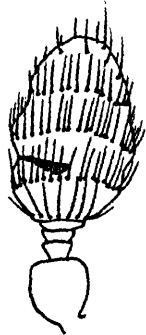


Fig. 18 Hypothenemus

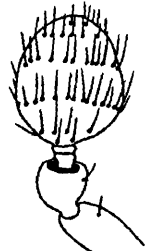


Fig. 20 Trischidias

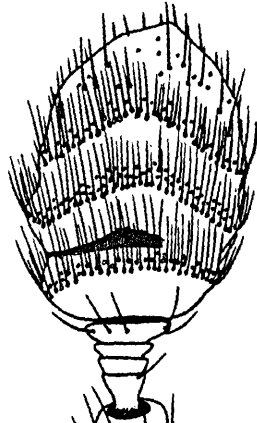


Fig. 22 Stephanoderes female

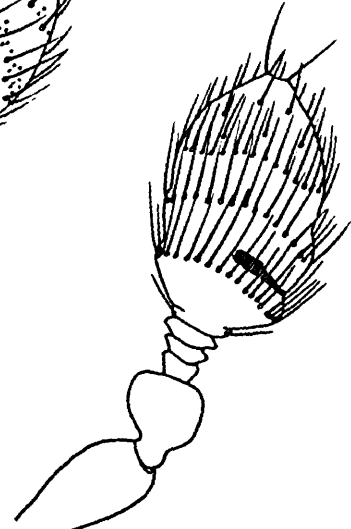


Fig. 24 Stephanoderes male



Fig. 19 Hypothenemus



Fig. 21 Stephanoderes castaneus

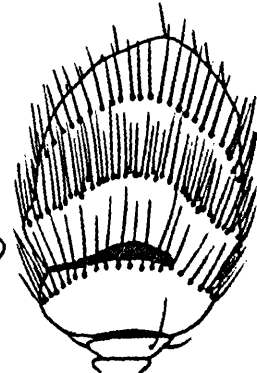


Fig. 23 Stephanoderes female

PLATE III

Figs. 25-32. The posterior face of prothoracic tibiae of representatives of the North American genera of Gryphalini (females) as follows: 25, Procryphalus utahensis; 26, Gryphalus populi; 27, Gryphalomorphus floridensis; 28, Taenioglyptes pubescens; 29, Hypocryphalus mangiferae; 30, Cryptocarenum porosus; 31, Stephanoderes dissimilis; 32, Hypothenemus eruditus.



Fig.25 Procryphalus



Fig.26 Cryphalus



Fig.27 Cryphalomorphus

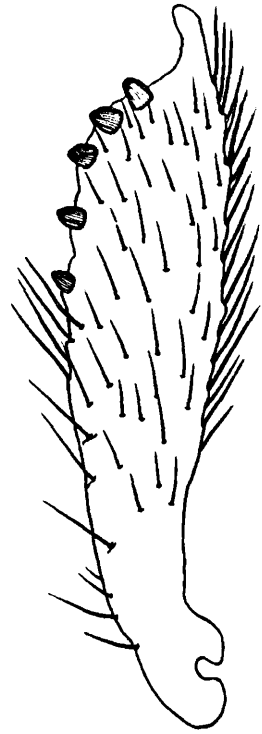


Fig.28 Taenioglyptes

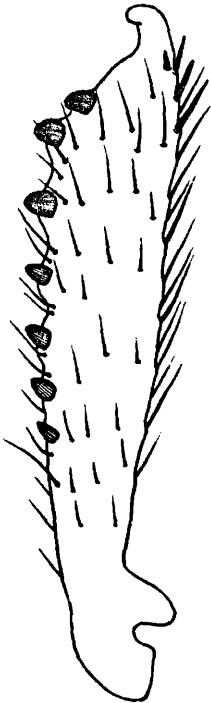


Fig 29 Hypocryphalus



Fig.30 Cryptocarenum

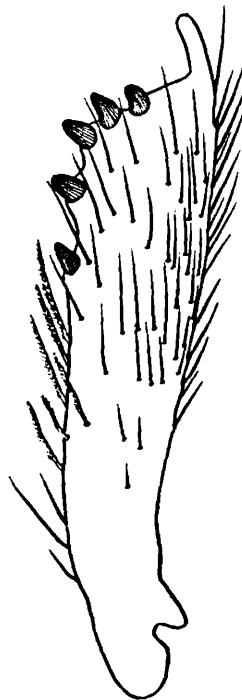


Fig.31 Stephanoderes



Fig.32 Hypothenemus

PLATE IV

Figs. 33-40. The anterior face of metathoracic tibiae of representatives of the North American genera of Cryphalini (females) as follows: 33, Procryphalus utahensis; 34, Cryphalus populi; 35, Cryphalomorphus floridensis; 36, Taenioglyptes pubescens; 37, Hypocryphalus mangiferae; 38, Cryptocarenum porosus; 39, Stephanoderes dissimilis; 40, Hypothenemus eruditus.

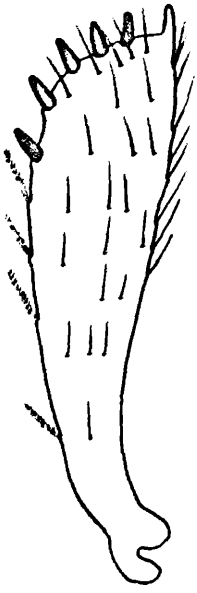


Fig.33 Procryphalus

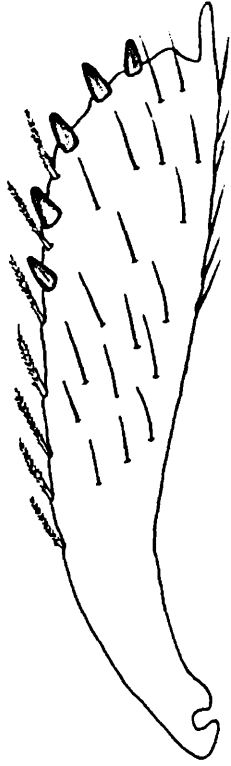


Fig.34 Cryphalus



Fig.35 Crypholomorphus



Fig.36 Toenioglyptes

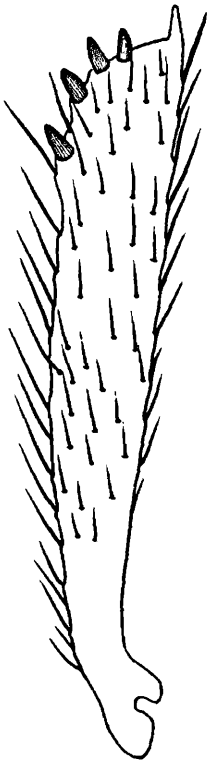


Fig.37 Hypocryphalus



Fig.38 Cryptocareus

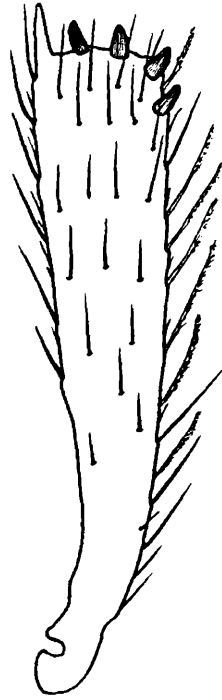


Fig.39 Stephanoderes



Fig.40 Hypothenemus

PLATE V

Fig. 41. Posterior-dorsal aspect of the seventh and eighth terga of a Taenioglyptes pubescens male.

Fig. 42. Posterior-dorsal aspect of the seventh tergum of a Taenioglyptes pubescens female.

Figs. 43-84. Outline drawings of the anterior margin of the pronotum of North American Cryphalini (females), from a dorsal and slightly posterior aspect, as follows: 43, Cryphalus nitidus; 44, C. salicis; 45, C. populi; 46, Procryphalus aceris; 47, P. utahensis; 48, P. mucronatus; 49, Cryphalomorphus floridensis; 50-52, Taenioglyptes ruficollis ruficollis, individual variations from a single series; 53, Hypocryphalus mangiferae; 54, Cryptocarenum porosus; 55, C. floridensis; 56, Stephanoderes hirsutus; 57, S. dissimilis; 58, S. rotundicollis; 59, S. erectus; 60, S. castaneus; 61, S. obesus; 62-63, S. brunneus, variations; 64-65, S. interstitialis, variations; 66, S. nitidipennis; 67, S. squamosus; 68, S. obscurus; 69, S. andersoni; 70, S. liquidambarae; 71, S. niger; 72, S. georgiae; 73-74, S. sparsus; 75, Hypothenemus californicus tritici; 76, H. c. californicus; 77, H. eruditus; 78, H. pubescens; 79, H. beameri; 80, H. columbi; 81, H. distinctus; 82, H. miles; 83, Trischidias atoma; 84, T. minutissima.

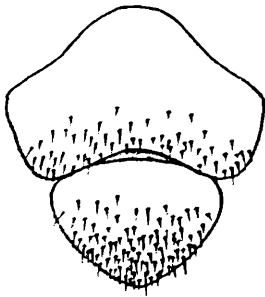


Fig. 41 *Taenioglyptes* male

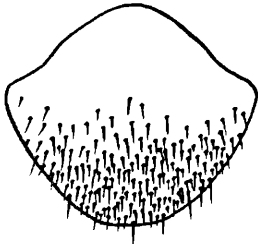


Fig. 42 *Taenioglyptes* female

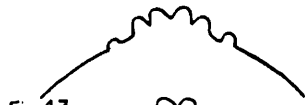


Fig. 43

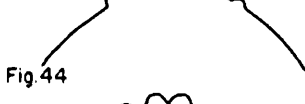


Fig. 44



Fig. 45



Fig. 46



Fig. 47



Fig. 48



Fig. 49



Fig. 50



Fig. 51



Fig. 52



Fig. 53



Fig. 54

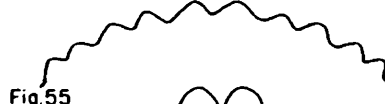


Fig. 55



Fig. 56



Fig. 57



Fig. 58



Fig. 59



Fig. 60

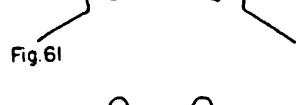


Fig. 61



Fig. 62

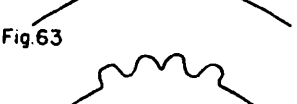


Fig. 63

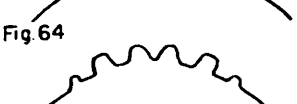


Fig. 64

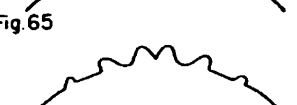


Fig. 65



Fig. 66

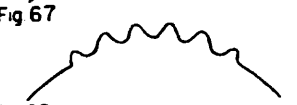


Fig. 67



Fig. 68



Fig. 69



Fig. 70



Fig. 71

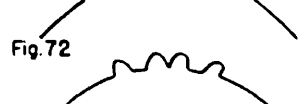


Fig. 72

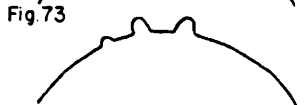


Fig. 73

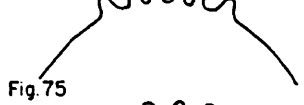


Fig. 74



Fig. 75

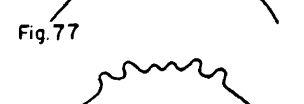


Fig. 76

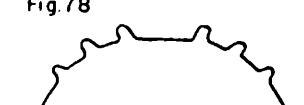


Fig. 77

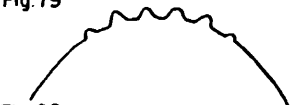


Fig. 78



Fig. 79

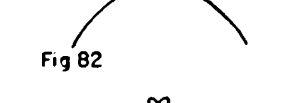


Fig. 80



Fig. 81



Fig. 82



Fig. 83

Fig. 84

PLATE VI

Figs. 85-120. Outline drawings of an individual interstitial bristle from the second declivital interspace, near the center of the declivity, of North American Cryphalini as follows: 85, Procryphalus aceris; 86, P. utahensis; 87, P. mucronatus; 88, Cryphalus nitidus; 89, C. salicius; 90, C. thatcheri; 91, C. populi; 92, Cryphalomorphus floridensis; 93, Cryptocarenum porosus; 94, C. floridensis; 95, Stephanoderes hirsutus; 96, S. dissimilis; 97, S. rotundicollis; 98, S. erectus; 99, S. castaneus; 100, S. obesus; 101, S. brunneus; 102, S. interstitialis; 103, S. nitidipennis; 104, S. squamosus; 105, S. obscurus; 106, S. andersoni; 107, S. liquidambarae; 108, S. georgiae; 109, S. niger; 110, S. sparsus; 111, Hypothenemus californicus californicus; 112, H. c. tritici; 113-114, H. eruditus; 115, H. pubescens; 116, H. columbi; 117, H. distinctus; 118, H. miles; 119, Trischidias atoma; 120, T. minutissima.

Fig. 121. The relative frequencies (percentage) of six classes of Hypothenemus eruditus specimens occurring in each of four series collected July 10, 1951, at Homestead, Florida, from Sambucus canadensis (44 specimens), Bauhinia grandiceps (57 specimens), Hibiscus rosasinensis (38 specimens), and Tectona grandis (15 specimens). The six classes are based on the relative width versus length of the bristles on the second declivital interspace as follows: 1, 1.62 or less; 2, 1.63-1.87; 3, 1.88-2.12; 4, 2.13-2.37; 5, 2.38-2.62; and 6, 2.63 or more times as long as wide.



Fig.95

Fig.96

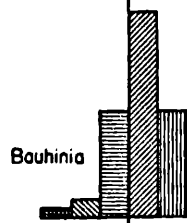
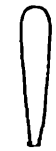
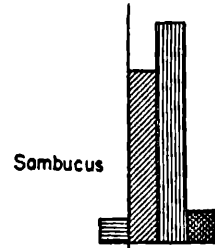


Fig.101

Fig.102

Fig.103

Fig.104

Fig.105

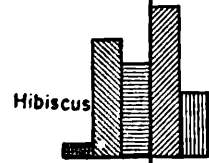


Fig 106

Fig 107

Fig.108

Fig.109

Fig.110

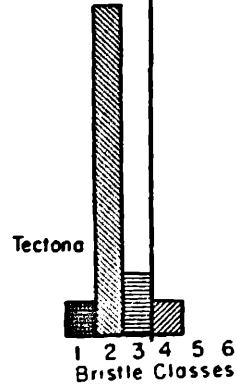
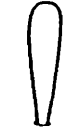


Fig 111

Fig 112

Fig 113

Fig.114

Fig.115



Fig 116

Fig 117

Fig 118

Fig 119

Fig 120

Fig 121 Hypothenemus eruditus