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Species of the Genus Syneta of the World (Coleoptera: Chrysomeloidea)

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The members of the genus *Syneta* have long proved a challenge to beetle taxonomists. Distinct characters exist for separating most of the species, with no serious confusion occurring except between *Syneta albida* Leconte and *Syneta seriata* Leconte. Unfortunately, however, no entomologist has ever cited these characters, particularly those necessary in distinguishing the females of the various species from one another. A rather thorough study of all members of *Syneta* known to occur in the world was undertaken by the author in an attempt to rectify this situation. On the accompanying plates will be found illustrations of the male genital appendages of all known species, which should eliminate any doubt concerning the true identity of members of that sex (except for the very similar *S. albida* Leconte and *S. seriata* Leconte of the Pacific Coast). Female specimens present a much more difficult problem, but by carefully examining the epipleurae, tibiae, and frons it should always be possible to arrive at correct determinations.

In variation, forms of every [illegible] study of *Syneta* it must first of all be understood that characters based upon coloration, natu sculpture, and denticulation of the pronotum are sel taxonomically valid. True, certain species may e tain characteristic color or color pattern, but an significance is nullified by the sad fact that a few nearly every other species occasionally exhibit th colors. In fact, elytral coloration may run the gam form black to uniform pale yellow or whitish with

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species. There is an occasional tendency toward the formation of a rufous- or piceous-colored stripe along the elytral suture and more rarely a similar stripe may occur on the fourth elytral costa. So complete is the color variation within species that even in the population of *Syneta albida* Leconte (which is normally very pale yellow or albinistic) certain individuals have been found which are totally black, while many specimens were seen with a broad black sutural stripe. Dr. G. H. Horn, who made a study of the genus in 1892 and 1893, acknowledged the fact that color, elytral sculpture, and pronotal denticulation were of extremely insignificant value in species determination. However he further stated that "the form of the antennae, together with the sexual peculiarities of the male, afford the only means of specific determination." Subsequent work has shown that even though Horn's characters were some improvement, they are often insufficient to allow positive species determination. It remained for Brisley (1927) to call attention to the piceous spurs at the tips of the posterior tibiae which serve to separate the members of the genus into two groups. One group contains *S. albida* Leconte, *S. seriata* Leconte, and *S. simplex* Leconte (hind tibiae each bearing a single piceous spur at tip) while the other accommodates all other known species in the world. Once the genus has thus been subdivided it becomes a lesser task to break down each group into species. If the specimens are males and were collected in Canada or anywhere in western United States, it is desirable to remove the terminalia and mount them beneath the beetle on a paper point on the same pin. This allows unequivocable identifications. (Since only one species is known from Japan, Europe, and eastern United States, respectively, there is no need for genitalic dissections of specimens from those regions.) However, if the specimens are females or if it is deemed undesirable to remove the genital appendages, the nature of the epipleurae and tibiae, the type of elytral vestiture, and the sculpture of the frons will suffice to separate the species quite readily in nearly every case.

The separation of the sexes of *Syneta* is such an easy matter that it may be accomplished with the naked eye by merely glancing at the ventral tip of the abdomen. Females of all species have a huge semicircular excavation at the lower posterior

margin of the last visible ventral abdominal segment, while in males this last ventral sternite is smooth and flat beneath.

Removal of the male terminalia is not difficult. If the specimen has been dead for a long time it is imperative that it be thoroughly relaxed before beginning the dissection. Immersion in warm water for two or three hours is usually sufficient and the process can be speeded considerably by the addition of a wetting agent or spreading agent to reduce the surface tension of the water. After relaxing the insect, bend the tip of the abdomen down and then cut or tear the lateral sutures of the last abdominal segment so that the tergite and sternite may be spread apart. Simple tools for this operation may be made by sticking insect pin points into pieces of hard wood, then bending them down until the shank of the pin lies flat on the surface of the wood. The resultant small hooked or bent pinpoints should then be used antagonistically to tear the sutures mentioned above. After separating the tergite from the sternite, one of the hooked pins should be inserted far up into the posterior abdominal cavity and hooked over the anterior end of the aedeagus, after which the aedeagus can be rather easily removed by pulling the pin out and dragging the terminalia out with it. It is wise to mount the aedeagus immediately after dissection, gluing it to a paper point on the same pin as the beetle.

Members of the genus *Thricolema* (=*Tricolema*) Crotch bear a close resemblance to those of *Syneta* in every way except for the fact that the females have simple tarsal claws, whereas all members of *Syneta* of both sexes possess cleft claws. Because Brisley (1927) has treated *Thricolema* as a distinct genus and since its true position is still merely a matter of opinion, it is deemed advisable to continue to consider it as distinct in order to avoid further confusion in the literature. It is represented by only one known species in the world, *T. anomala* Crotch, which occurs only in California. The male terminalia of *Thricolema* are quite similar in shape to those of *Syneta hamata* Horn, but are considerably longer in proportion to body length and have the ventral terminal extension even more strongly developed than in *Syneta pilosa* Brown (see plate 2). See the discussion of the family Orsodacnidae on the following pages for details of the appearance of *Thricolema* and the ways in which it differs from *Syneta*.

Acknowledgments

Owing to the prevalence of errors in the identification of members of *Syneta* and the close superficial similarity of all species known today, the task of unscrambling the details has been time consuming and has necessitated the author's seeking aid from many other entomologists. Through the kindness of Dr. E. C. Van Dyke and Hugh B. Leech it was possible for the author to make a thorough study of the hundreds of specimens in the California Academy of Sciences collection in San Francisco. Dr. Van Dyke possessed a tremendous amount of information concerning the biology and geographical distribution of these beetles and was gracious enough to place this extensive knowledge at the disposal of the writer. Dr. M. H. Hatch of Seattle; Dr. P. D. Hurd and Dr. J. W. MacSwain of the University of California at Berkeley; Mr. B. E. White of Merced, California; Mr. A. T. McClay of the University of California at Davis; Dr. W. F. Barr of the University of Idaho; and Dr. J. W. Tilden of San Jose State College also permitted the study of their specimens of *Syneta*. W. J. Brown, the eminent Canadian chrysomelidist, not only sent a large series from Labrador and northeastern Canada, but also donated paratypes of *Syneta extorris* Brown from the Great Smoky Mountains and added tremendously to the knowledge concerning the ecology and distribution of various distinctive populations of *Syneta* in eastern North America. J. Balfour-Browne loaned specimens from the British Museum of Natural History, compared several specimens with the type specimens in the Museum, and always responded quickly to correspondence seeking his aid. Naturaliste Pierre Jolivet of the Royal Institute of Natural Sciences of Belgium loaned the author all of the specimens of *Syneta* in that institution's collection and has evinced much interest in the study of the genus. In addition to these entomologists who loaned specimens for study there were many others who helped by contributing information concerning type specimens and who aided greatly in clearing up puzzling situations encountered in early literature concerning the genus. Especially valuable have been the contributions of Dr. M. A. Cazier and Dr. F. H. Rindge of the American Museum of Natural History; Dr. E. G. Linsley and Dr. R. L. Usinger of the University of California at Berke-

ley; Professor David Dunavan of Clemson Agricultural College; Dr. J. L. Gressitt, now at the Bishop Museum in Honolulu; Dr. Richard Frey, of the Zoological Museum of Helsingfors, Finland. Dr. P. J. Darlington Jr. of the Museum of Comparative Zoology at Harvard; James A. G. Rehn of the Philadelphia Academy of Natural Sciences; and Dr. R. H. Arnett Jr., Dr. O. L. Cartwright, and the late H. S. Barber, all of the United States National Museum. To all of these men the author is extremely grateful, because without their competent and willing cooperation it would have been impossible to complete this review.

Family Orsodacnidae

The coleopterous family Chrysomelidae is now considered by many entomologists, especially those in Europe, as being composed of such an aggregate of dissimilar beetles as to warrant its being considered as a superfamily. Within this proposed superfamily, called Chrysomeloidea, there may be recognized numerous "families" which were originally portions of the family Chrysomelidae. These families exhibit differences in larval structure which are usually much more pronounced than those of the adults. One such family is Orsodacnidae, which is represented in the United States by the genera *Syneta, Thricolema, Orsodacna,* and *Zeugophora.* The genus *Pedrilliomorpha* from Sikkim apparently also belongs here. The foreign genus *Pedrillia* Westwood was termed a synonym of *Zeugophora* by Bryant in 1943.

The characters by which adults of the family Orsodacnidae may be separated from other Chrysomeloidea are: (1) the head is never buried in the thorax to the eyes, and is narrowed into a distinct neck behind the eyes; (2) the base of the pronotum is much narrower than the elytral base; (3) the prothorax is never completely margined on the sides, but is often denticulate laterally; (4) the elytra are punctate and customarily also show at least some trace of longitudinal carinae; (5) the front coxae are contiguous or very nearly so (the prosternal spine is sliver-thin and usually quite short); (6) the front coxae are closed behind except in *Syneta* and *Thricolema;* (7) the tarsal claws are almost always cleft or appendiculate; (8) the tegmen is usually ring-shaped but is sometimes V-shaped or slightly Y-shaped; (9)

the proximal end of the aedeagus (median lobe) is deeply cleft, thus forming two distinct, flattened median struts; and (10) the wing venation is greatly reduced. Jolivet (personal correspondence, 1950) expresses his belief that Orsodacnidae should consist of two subfamilies, one containing *Zeugophora, Pedrillia,* and *Orsodacne* (Orsodacninae) and the other embracing *Syneta* and *Thricolema* (Synetinae). Crowson (1946), in his revision of the chrysomelid group Sagrinae, includes *Syneta* therein "only because of its obvious connection with *Orsodacne,*" which he says "is unquestionably a member of the group as I have defined it." Although in this article (January, 1946) Crowson lumped Sagrinae and Orsodacninae together, following the lead of Lacordaire and Chapuis, and considered them as "Group Sagrinae," he appended a footnote stating that "I now consider it better (May, 1946) to keep the subfamilies separate." Chen (1940) carefully studied the leaf-beetles, especially with regards to their general external characters, the venation of their posterior wings, the structure of the male genitalia, and the nature of the larvae of each group. He arrived at a somewhat different classification of the members of Chrysomeloidea than any previous entomologist, considering the family Donaciidae as corresponding to the Eupoda, minus Criocerinae, plus Megascelinae and Megalopodinae. Under Donaciidae he then lists five subfamilies, Sagrinae, Donaciinae, Orsodacninae, Megascelinae, and Megalopodinae. Unfortunately, Chen was not able to examine specimens of *Syneta,* hence did not mention that genus in his admirable study of the classification of Phytophaga. He would probably have found it necessary to add a sixth subfamily to accommodate this genus and *Thricolema,* since they seem to be highly specialized in many ways and are apparently phylogenetically intermediate between the Orsodacnidae of the Eupoda (that is Chen's "family Donaciidae, subfamily Orsodacninae") and the family Crioceridae. Until a complete study of *Syneta* and *Thricolema* can be made, based upon all the characters utilized by Chen, it seems desirable to include them as highly aberrant members of family Orsodacnidae, situated intermediately between that family and Crioceridae. (The latter family has the tegmen Y-shaped, with its base very large and flat, while in *Syneta* the base is nearly non-existent.) Ac-

tually the writer believes that the two genera in question differ so radically from the other groups of the Orsodacnidae that it would be desirable to consider them as constituting a separate family, the Synetidae. This would leave Orsodacnidae as a discrete aggregation possessing the same characters as Synetidae except for the structure of the anterior coxal cavities, the male genitalia, the tarsal claws, the wing veins, and probably the larval stages. Thus the members of Orsodacnidae could be distinguished by having a strongly bilobed ligula, emarginate eyes, confused elytral punctation, tarsal claws usually appendiculate, front coxal cavities closed, tegmen ring-like and with well developed lateral lobes above the aedeagus, and larvae which are usually leaf-miners. Members of Synetidae would all have a feebly bifid ligula, entire eyes, elytral punctures serially arranged (except in *Thricolema anomala* Crotch), tarsal claws bifid (except in female *Thricolema*), front coxal cavities open behind, tegmen V-shaped or slightly Y-shaped, without true lateral lobes (parameres), and larvae which (it is believed) all live underground and feed on rootlets. Sagridae and Donaciidae would then fall between Orsodacnidae and Synetidae, both in regard to larval habits and the structure of male genitalia. Further study is obviously essential before any definite commitment can be made with regard to this proposed new family, hence the discussion of it as such at this time is tentative and is offered merely as a suggestion for future consideration.

Syneta Dejean.

Crioceris Geoffroy. Fabricius, 1792, page 5; and 1801, page 462. Melsheimer, 1806, page 25. Lacordaire, 1845, page 233 (correction of Say's misspelling of the generic name in a copy of the description of *Orsodacna tripla*, where Say listed *Crioceres asparagi* as a synonym).

Crioceris Fabricius. Dejean, 1821, page 115 (in synonymy); Zetterstedt, 1828, page 389 (in synonymy); and 1840, page 214 (in synonymy); Lacordaire, 1845, page 226 (in synonymy).

Lema Fabricius. Schoenherr, 1808, page 286; Thomson, 1885, page 160.

Donacia Fabricius. Germar, 1811, page 34; Lacordaire, 1845, page 226 (in synonymy).

Orsodachna Gyllenhaal, 1813, page 642; Zetterstedt, 1828, page 389 (in synonymy); and 1840, page 214 (in synonymy); Thomson, 1866, page 131 (in synonymy).

Orsodachna Latreille. NEWMAN, 1838, page 391 (emendation of *Orsodacne* Latreille).

Orsodacna Latreille. SAY, 1826, page 281 (emendation of *Orsodacne* Latreille). LACORDAIRE, 1845, page 233 (emendation of *Orsodachna* Latreille. NEWMAN, 1838).

Orsodacna Gyllenhaal. LACORDAIRE, 1845, page 226 (emendation of *Orsodachna* Gyllenhaal).

Auchenia Megerle. DEJEAN, 1821, page 114; SAY, 1826, page 281 (mentioned as the possible generic designation, instead of *Orsodacna*).

Auchenia Dejean. ZETTERSTEDT, 1828, page 389; and 1840, page 214.

Auchenia Zetterstedt. LACORDAIRE, 1845, page 226 (in synonymy).

Crioceres (no author mentioned). SAY, 1826, page 281 (misspelling of *Crioceris* of Melsheimer Catalogue of 1806) (in synonymy).

Syneta Eschscholtz. DEJEAN, 1835, page 359; 1837, page 361; and 1837 (3rd edition, revised), page 385; MANNERHEIM, 1843, page 307; LACORDAIRE, 1845, page 226, MELSHEIMER, 1853, page 117; LECONTE, 1857 (1860), pages 24 and 66; SCHAUM, 1862, page 106; DUVAL and FAIRMAIRE, 1868, page 254; CROTCH and CANTAB, 1873, page 24; HEYDEN, 1880–1881, page 197; HENSHAW, 1885, page 105; JACOBY, 1885, page 193; HORN, 1892, page 1; and 1893, page 133; JACOBY, 1903, page 10.

Syneta Dejean. BROWN, 1940, page 39.

Syneta Lacordaire. THOMSON, 1866, page 131; GEMMINGER and HAROLD, 1874, page 3248; REDTENBACHER, 1874, page 444; MARSEUL, 1889, page 491; HEYDEN, REITTER and WEISE, 1891, page 713; REITTER, 1912, page 82; CLAVAREAU, 1913, page 36; BRISLEY, 1927, page 58; BELLER and HATCH, 1932, page 74, WU, 1937, page 779; GRESSITT, 1942, page 278; and 1945, page 136; CROWSON, 1946, page 93.

Syneta Leconte. BRISLEY, 1927, page 58 (typographical error); BELLER, and HATCH, 1932, page 75 (typographical error).

TYPE OF GENUS: *Syneta betulae* (Fabricius).

This generic name was first proposed by Eschscholtz, who established it in his collection but never published it. Its linguistic derivation is from the Greek word meaning "sagacious." Dejean, in the last two editions of his Catalogue of the Coleoptera, listed *Syneta* but failed to mention any characters. However he listed three species under this genus, one of which was *S. betulae* Fabricius. (The other two species listed were nomina nuda.) Fol-

lowing the reasoning of Barber and Bridwell (1940) that an author's name following a trivial name in the Dejean Catalogue is in effect a bibliographical citation, there remains no doubt about the identity of *Syneta betulae* (Fabricius). This species was described by Fabricius as *Crioceris betulae* and later considered by various authors to be a member of *Lema, Orsodachna,* and *Auchenia,* successively. All of these generic names had been applied previously to beetles which are quite unlike *S. betulae,* so *Syneta* was the first available generic name. Dejean listed that name, followed by a previously recognized trivial name, *"betulae,"* and the abbreviation of its author's name. This condition satisfies the provisions of Article 25 of the Rules of the International Commission on Zoological Nomenclature (as amended to 1950), hence the name *Syneta* possesses full rights under the Law of Priority. Since *S. betulae* Fabricius was the only valid species included by Dejean under the name *Syneta* it automatically becomes the type of the genus.

Description of the Genus

Body elongate, relatively slender, 4 to 7 mm. in length, not very heavily sclerotized; *head* orbicular, enlarged across the middle, abruptly narrowed into a broad neck at some distance behind the eyes; *eyes* relatively small, convex, entire, and located at sides of broadest part of head; *pronotum* base about two-thirds as wide as base of elytra; apex of pronotum is as wide as base, but middle is dilated and more or less denticulate or toothed on sides (in addition to these denticulations, all known species bear a distinct bulbous callosity at each lateral front margin of the pronotum and usually also a smaller callosity near each lateral rear margin); *elytra* elongate, moderately convex, and with parallel outer margins; *humeri* of elytra sharply rounded and prominent; *elytral punctation* very coarse, prominent, and serially aranged for the most part, with rather broad intervals between punctures; four distinct *elytral costae* (in addition to the sutural and epipleural elevations) occur on each elytron, although in some species these costae may be feeble (especially the first one, which is located about halfway between the suture and the humerus) and the third one usually appears only as a short posterior carina; *epipleurae* prominent, often

very broad and nearly horizontal, bearing large, distinct punctures; *wing venation* greatly reduced; *scutellum* relatively large, rectangular or rhombohedral; *labrum* large, free, usually strongly rounded in front; *mandibles* short and robust, with strongly arcuate front edge; *maxillae* each very large, the *cardo* concealed beneath the long, broad *stipes*, the *palpifer* distinct but small; the *galea* broad, thick, 2-segmented and strongly curved inward; *maxillary palpi* broad, thick and 4-segmented, with first segment small and indistinct and fourth segment elongate, cylindrical, with truncate tip; *mentum* short, directed more or less inward (dorsad) toward the buccal cavity; *labium* horizontal, a little longer than the mentum and with short, 3-segmented *palpus* inserted on each side near its base; *ligula* feebly notched at its apex; *antennae* slender, arising from front of head between anterior portion of the eyes, the first antennal segment about half again as thick as the remaining ten segments, most of which are about three times as long as they are thick; five *ventral abdominal segments* visible in both sexes at all times; fifth ventral segment of *male abdomen* is flat and bears a lobe at its tip, while the fifth sternite of the *female abdomen* is excavated beneath with a very deep, densely fimbriate, semicircular concavity (see plate 1); *male terminalia* represented by a prominent median lobe and a delicate V-shaped tegment (see plate 2); *lateral lobes* (parameres) never present; *median lobe* variable in shape; *legs* long and rather slender; *front coxae* large, nearly contiguous but narrowly separated by the very slender prothoracic spine and widely open behind; *middle coxae* as large as those of the fore legs and narrowly separated by a very slender mesothoracic

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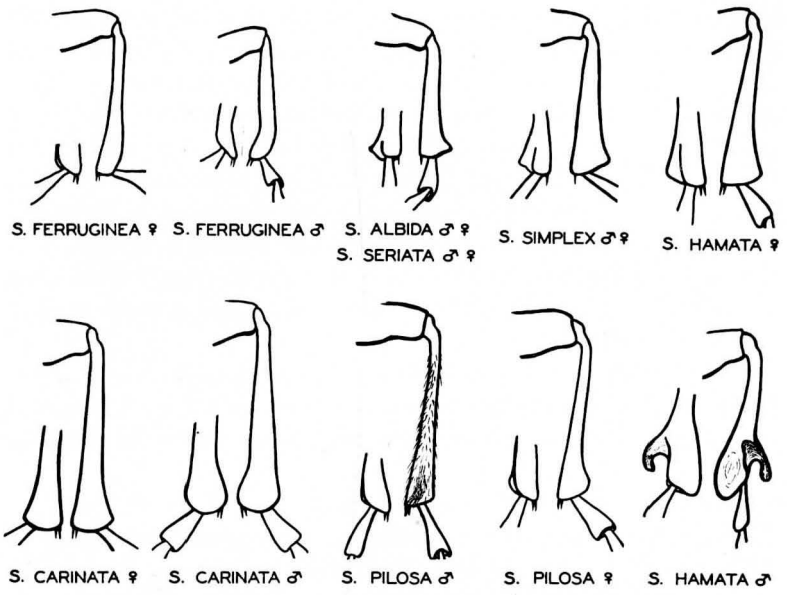
PLATE 1

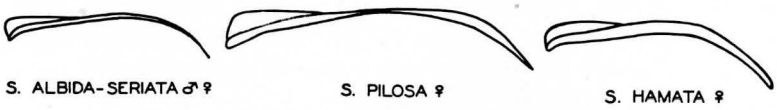
Left hind tibia of male (♂) and female (♀) of Holarctic species of *Syneta*. (X12.) Lateral view shows entire tibia while medial view illustrates the tibial tip.

Ventral view of three types of epipleurae of *Syneta*, with the umbone visible in the upper lefthand region of each illustration. (X6)

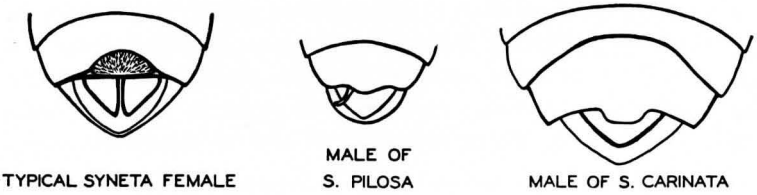
Ventral view of apex of abdomen. (X12.) Typical female at left, showing the densely fimbriate concavity which is common to all females of *Syneta*. Male of *S. pilosa* at center, with tip of aedeagus protruding. Male of *S. carinata* at right, showing lobe at apex of last visible abdominal sternite.



LEFT HIND TIBIA - LATERAL AND MEDIAL VIEWS



EPIPLEURA - VENTRAL VIEW



APEX OF ABDOMEN - VENTRAL VIEW

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spine; *hind coxae* well separated, transverse, disappearing laterally beneath the epipleurae; *femora* all elongate and rather slender but with the posterior pair slightly heavier than others; *tibiae* short and slender (except in *Syneta hamata* Horn, which has hamate hind tibiae) but enlarged a little at their tips (see plate 1); *tarsi* about as broad as tibiae but considerably flattened and with segments 1 to 3 densely hairy beneath, first and second segments triangular and subequal, third segment deeply bilobed, fourth extremely inconspicuous and concealed in the notch of segment 3 and firmly united with the rather long and slender fifth segment; *tarsal claws* of both sexes distinctly cleft, each claw consisting of a long, thick outer portion and a shorter, more slender inner structure.

The female (of *Syneta albida*, at least) drops her eggs upon the ground at random, with no attempt at concealing them, and after two or three weeks they will hatch when exposed to moisture.

The larvae of *Syneta albida* Leconte have been obtained by digging about the delicate rootlets of fruit trees. According to Wilson and Moznette (1913–1914) they are small, slightly C-shaped grub-like creatures, whitish in color but with the head-capsule light brown and the mandibles, clypeal margin, and tips of legs dark brown. The entire body is furnished with hairs, those on dorsal parts being fragile but those beneath the body appearing distinctly spine-like. These ventral spines are in rows along the apices of folds on each segment and appear to assist the larvae in crawling underground.

In 1942 Dr. J. Linsley Gressitt described six new species of *Syneta* from south and west China (*Syneta hainana, S. ventralis, S. magniscapa, S. unicolor, S. abbreviatus,* and *S. brevidentata*). Unfortunately, although these resemble true *Syneta* in some respects, they are actually members of genus *Aulexis* of the family Eumolpidae. Dr. Gressitt clarified this point in his 1945 publication, as well as calling attention to several taxonomic vaga-

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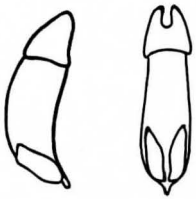
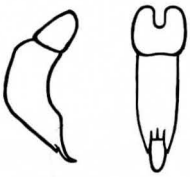
PLATE 2

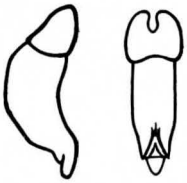
Aedeagus of every known species of *Syneta*. (X18.) In each case the lateral view is at left and dorsal view is at right. (Lower center illustration is a lateral view of the aedeagus of *Thricolema anomala* Crotch, to indicate its similarity to some species of *Syneta*.)



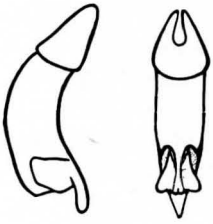
S. ADAMSI



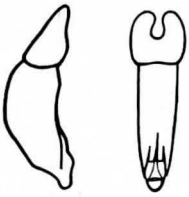
S. ALBIDA-SERIATA



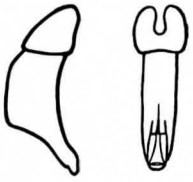
S. SIMPLEX



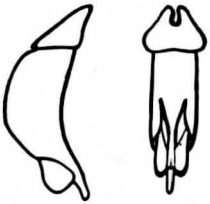
S. HAMATA



S. SIMPLEX

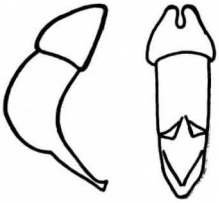


S. SIMPLEX SUBALPINA

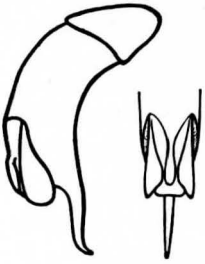


S. BETULAE

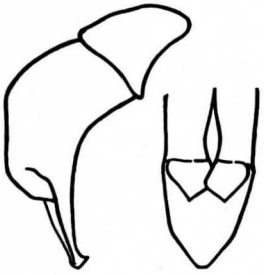
TRICOLEMA ANOMALA



S. FERRUGINEA



S. PILOSA



S. CARINATA

JGE

AEDEAGUS FROM LATERAL AND DORSAL VIEW

ries which lead to confusion of Orsodacnidae and Eumolpidae. Several Oriental members of the tribe Leprotini (Eumolpidae) differ from the bulk of that family in most of the supposed fundamental characters which have been used to separate the Eumolpinae (which Gressitt considers as a subfamily of Chrysomelidae), representing the major division Cyclica, from the division Eupodes, which includes Orsodacnidae (subfamily Orsodacninae, according to Gressitt). Dr. Gressitt feels that "this is not accidentalism or 'parallelism,' but may in fact be an indication of relationship between subfamilies Eumolpinae and Orsodacninae," and that "Eumolpinae may have originated from the extinct ancestors of *Syneta* or a *Syneta*-like form." The relationship between Orsodacnidae (or Orsodacninae) and Synetidae (or Synetinae) and their allies has been discussed in the section of the present paper dealing with the family Orsodacnidae. In that section it is noted that *Syneta*, while usually considered as a highly aberrant member of the Orsodacnidae, is actually different from members of that family in several ways and seems to be intermediate between Orsodacnidae and Crioceridae (the group Eupodes, which originally embraced all three of these categories, is generally conceded to be unreasonably heterogeneous and is therefore dismissed from consideration as a valid entity in this publication). Hence there is no disagreement with Gressitt's general conclusions concerning the relationship between "subfamilies Eumolpinae and Orsodacninae." There is also no dispute with Chen's view that the probable ancestral stock of all of these categories was a form close to our present-day Sagrinae. Development possibly proceeded on the one hand through the Orsodacninae to *Syneta*, Criocerinae, etc., and along a different evolutionary line through the Megalopodinae and the camptosomatic subfamilies to the Eumolpinae.

Synopsis of the Species of Syneta

Members of this small genus are inconspicuous little tan or ocher-colored beetles, occasionally marked with rufous or black stripes and sometimes even completely rufous or black in color. The genus is entirely holarctic, with general distribution of the species as follows: *Syneta adamsi* Baly in Japan, Manchuria and Siberia; *S. betulae* (Fabricius) in northern Europe, Scandinavia, and Lapland; *S. carinata* Mannerheim from Alaska to the moun-

tains of Montana, Idaho, and Utah, as well as along the Pacific Coast to Washington, Oregon, and northern California (in mountains); *S. pilosa* Brown has the same general range as *S. carinata* but also occurs eastward to Canada's Maritime Provinces and Newfoundland; *S. hamata* Horn is spread over the same area as *S. carinata* and has also been recorded from Wyoming; *S. ferruginea* (Germar) has a range extending from eastern Canada and Newfoundland throughout New England and the midwestern states and as far south as South Carolina, Tennessee and Georgia in the mountains; *S. albida* Leconte is found in British Columbia, western Washington, Oregon, and northern California; *S. simplex* Leconte abounds in the same areas as does *S. albida;* and *S. seriata* Leconte is known only from low elevations in the San Francisco Bay Area and in much of the San Joaquin Valley as far south as Kaweah and northward to Red Bluff.

Most species are host-specific to a remarkable degree, and their range may usually be anticipated by observing the geographical distribution of the respective host plants. Only one species, *Syneta albida* Leconte, is of much economic importance, the adults feeding upon leaves, buds, flowers, and fruit of various orchard trees and berry bushes while the larvae apparently do some slight damage to the rootlets. Members of this destructive species are commonly called "western fruit-beetles" or "fruit tree leaf synetas," and have occasionally damaged as much as one-third to three-fourths of the pear crop or apple crop in the Pacific Northwest. Yother (1916) reported the entire plum crop near Vancouver, Washington, ruined by May 1. Many control measures have been tried but none has been entirely satisfactory. The native food is apparently vine maple and hazelnut, which presents the interesting possibility that *S. ferruginea* of eastern United States may someday become a similar pest, since Blatchley (1910) reported it from hazelnut (*Corylus*) in southern Indiana. Other species may occasionally injure fruit trees, also, but evidently at present time this damage is never serious.

Key to the Species of Syneta of the World

1. Last visible ventral abdominal segment with a deep, semicircular fimbriate excavation, as illustrated in plate 1 (females).... 11

— Last visible ventral abdominal segment not excavated (males) 2

2. (1) Hind tibiae hamate (plate 1); aedeagus as in plate 2 ..... *S. hamata* Horn

— Hind tibiae not hamate 3

3. (2) Each hind tibia bears two distinct spurs at tip 4

— Each hind tibia bears only one distinct spur at tip 8

4. (3) Each elytral puncture bears a hair of moderate length which projects far out of the puncture 5

— Most elytral punctures have hairs so short that they do not project out beyond the puncture 7

5. (4) Epipleurae bear longitudinal row of very distinct punctures; aedeagus not as described below 6

— Epipleurae not distinctly punctate; hairs of elytral punctures erect, prominent and scraggly; aedeagus as in plate 2; nearctic species ..... *S. pilosa* Brown

6. (5) Epipleural surface concave, with distinct longitudinal row of punctures down the center; elytral pubescence rather long but extremely decumbent; aedeagus as in plate 2; palearctic species ..... *S. betulae* (Fabricius)

— Eplipleurae flat, with distinct longitudinal row of punctures along extreme inner margin; elytral pubescence short and semi-erect; aedeagus as in plate 2; oriental species (Japan and Siberia) ..... *S. adamsi* Baly

7. (4) Hind tibiae swollen at apex, as in plate 1; aedeagus as in plate 2; western North America ..... *S. carinata* Mannerheim

— Hind tibiae with slender apex which is bent forward as in plate 1; aedeagus shaped as in plate 2; central and eastern North America ..... *S. ferruginea* (Germar)

8. (3) Elytral pubescence usually very dense, with prominent hairs extruding from elytral punctures; elytral surface rather evenly convex, without prominently elevated carinae and *without* a distinct sunken area between second and fourth elytral carinae; area between antennal bases nearly flat and these bases are as far apart as first antennal segment is long; aedeagus *not* broad and flat at tip 9

— Elytral pubescence extremely sparse; elytra may or may not be sunken between second and fourth carinae; antennal bases closer together than first antennal segment is long; aedeagus broad and flattened near tip, as in plate 2 10

9. (8) Luster of elytra waxy; aedeagus not abbreviated at tip; food-plant *Quercus;* length of elytral hairs variable ..... *S. simplex* Leconte

— Luster of elytra opaque; aedeagus as in plate 2; food-plant al-

pine fir; numerous long hairs on elytral carinae, each being about three times as long as the hairs projecting from elytral punctures.....*S. simplex subalpina*, new subspecies

10. (8) Region between antenal bases elevated into an abrupt transverse ridge or bunker, which is often nearly or entirely smooth; distinct sunken area between second and fourth elytral carinae; first and third elytral carinae distinct and prominent but very short; undamaged specimens have more than fifteen erect hairs along each second and fourth elytral carina (each hair is slightly longer than epipleural width); food-plant is not *Quercus*.....*S. albida* Leconte

— Region between antennal bases not so prominently elevated but densely pitted (at least in middle) with small punctures; sunken area between second and fourth elytral carinae not so pronounced; first and third elytral carinae usually obsolete; undamaged specimens have usually less than ten semi-erect setae on each second and fourth elytral carina, each being two or three times as long as epipleura is broad; food-plant is always *Quercus;* central California species.....*S. seriata Leconte*

11. (1) Two distinct spurs at tip of each hind tibia; epipleurae broad 12

— Only one distinct spur at tip of each hind tibia; epipleurae narrow 17

12. (11) Each elytral puncture bears a prominent extruded hair..... 13

— Elytral punctures without prominent hairs extruding from them 15

13. (12) Epipleurae appear to be interrupted in the region of the hind coxae, due to their *inner* edge being slanted very sharply upward there; epipleurae not conspicuously punctate; elytral pubescence moderately long and erect; Canada and western United States.....*S. pilosa* Brown

— Epipleurae of nearly uniform appearance throughout their central portion; epipleurae with longitudinal row of conspicuous punctures..... 14

14. (13) Epipleurae with longitudinal row of deep punctures down the center; epipleural surface somewhat concave; very few long, erect hairs on costae; northern Europe and Scandinavia.....
.....*S. betulae* (Fabricius)

— Epipleurae with longitudinal row of deep punctures along the extreme inner edge; epipleurae very flat; numerous very long, erect costal hairs; Japan and Siberia.....*S. adamsi* Baly

15. (12) Outer side of hind tibia expanded backward *much* further than inner rear edge (plate 1); epipleurae extremely broad and flat;

sides of pronotum usually bear three slender, widely separated teeth; western North America.....*S. hamata* Horn

— Outer and inner sides of hind tibiae extend backward about the same distance..... 16

16. (15) Epipleurae horizontal or sometimes with outer edge extending downward even lower than inner edge; carinae well developed, with deeply sunken areas between them; northwestern North America.....*S. carinata* Mannerheim

— Epipleurae distinctly slanting, with *inner* edge extending downward much further than outer edge; carinae obvious but without extreme sunken intercostal depressions; middle and eastern North America.....*S. ferruginea* (Germar)

17. (11) Antennal bases closer together than the first antennal segment is long; elytra *not* equipped with hairs protruding prominently from punctures..... 18

— Antennal bases as far apart as the first antennal segment is long; elytra bear hairs which extrude prominently from the punctures; elytral carinae (except fourth) are nearly entirely obliterated..... 19

18. (17) Elytral surface distinctly sunken or depressed between second and fourth carinae; region between antennal bases abruptly and prominently elevated into a transverse ridge or bunker which is only sparsely if at all punctured; antennal bases less than half the length of the first antennal segment apart; narrow, distinct longitudinal smooth line between eyes.....
.....*S. albida* Leconte

— Elytral surfaces well-rounded and convex, especially on the rear two-thirds of the elytra; area between antennal bases much less elevated (usually nearly flat) and rather coarsely and densely punctate; distance between antennal bases variable; elytra short, stubby, and broadened considerably behind middle; no longitudinal smooth line between eyes on front of head.....*S. seriata* Leconte

19. (17) Food-plant is Garry oak (*Quercus garryana* Hooker); lives at elevations considerably below timberline.....*S. simplex* Leconte

— Food-plant is alpine fir (*Abies lasiocarpa* Nuttall); found near timberline in Washington and British Columbia.....
.....*S. simplex subalpina*, new species

Syneta pilosa Brown.

Syneta carinata Mannerheim. HORN, 1892, page 3 (in part); SCHAEFFER, 1933, page 298.

Syneta pilosa BROWN, 1940, page 164.

TYPE LOCALITY: Mt. Lyall, Gaspé County, Quebec (1,500-foot elevation).

LOCATION OF TYPE SPECIMENS: Canadan National Collection in Ottawa.

FOOD PLANTS: White spruce, *Picea glauca* Voss (Newfoundland); lodgepole pine, *Pinus contorta* variety *latifolia* S. Watson (British Columbia).

MALE: Very distinct because of the long hair in each elytral puncture and the nonpunctate epipleurae, as stressed in the key to species. The epipleurae are greatly slanted, rather than horizontal (as those of *S. carinata* are), and from the latter species they may also be easily distinguished by the nature of the posterior tibiae. In *S. pilosa* there is a definite flattened or concave area on the outer surface near the tibial tip which is very densely hairy, while males of *S. carinata* have the corresponding area broadly swollen and lacking this densely hairy patch. The male genital appendages are very distinctive, also, being equipped with a much more prominent terminal process than any other species of *Syneta* in the world (although in the closely allied genus *Thricolema* Crotch the aedeagus is strikingly similar but even more spectacularly developed). Length of males is 5 to 7 mm.

FEMALE: Readily distinguishable by the pilose elytra, together with the peculiar interruption of the epipleurae in the vicinity of the hind coxae. In that region the epipleurae become slightly narrower and are very distinctly slanted *inward* (with outer edge extending downward much further than inner edge), a condition which no other known species even approaches and one which is unmistakeable.

GENERAL DISCUSSION: The color of specimens of *Syneta pilosa* may be uniformly tan, rufous, ferrugineous, piceous, or pale with a very narrow dark suture and sometimes also with darker carinae. Obviously, then, color characters are worse than useless. However, the characters mentioned above and in the key are infallible, in addition to which it will be found that the front of the head of *S. pilosa* usually bears three more or less distinctly delineated smooth areas, unlike any other known species of this genus. Also, the clypeus of *S. pilosa* is concave, at least in the center just beyond the front edge of the frons, being just as high

in places as the level of the frons itself. (Many specimens have the entire clypeus convexly swollen, except for a narrow, transverse, sunken median portion of the clypeo-frontal suture). In *S. carinata* this clypeus is never elevated as prominently as the frons, but instead is flattened or often concave over-all. Each hind tibia bears two piceous spurs at its tip and there is also a broad, shallow depression paralleling the front edge (much more prominent in males than in females). Individuals of this species are larger than any others except *S. carinata* and an occasional female of *S. hamata* or *S. ferruginea*. Elytral costae are more or less well developed, often with the first carina distinct only basally and the third rather feeble. The intercostal areas are not deeply sunken as they are so often in *S. carinata*. These beetles are customarily confused in collections with *Syneta carinata* Mannerheim, especially the females. They differ from *Thricolema anomala* Crotch (with which they may well be more closely allied than with some species of the genus *Syneta* in the strict sense) by being much less pubescent, having broader epipleurae, possessing serially arranged elytral punctures, and possessing cleft tarsal claws in both sexes (females of *Thricolema* have simple claws).

Two hundred and ten specimens were examined, from widely scattered localities. In the listings below, the data compiled by W. J. Brown (1940) have been incorporated to give a more complete distributional spread. NEWFOUNDLAND: Field-note localities only. NEW BRUNSWICK: Gloucester County (Bathurst); Northumberland County (Tabusintac). QUEBEC: Gaspé County (Mt. Lyall); Lake St. John County (Lake St. John district); Pontiac County (Duparquet, Laniel). ONTARIO: Little Current River. ALBERTA: Crowsnest Pass; Scott Glacier, Banff; Sunwapta River (Jasper District); Banff National Park (Clearwater River). YUKON TERRITORY: Kirkman Creek (latitude 63° N., longitude 137° W); Selkirk. BRITISH COLUMBIA: Copper Mountain; Creston; Fish Lake (Summerland); Fort St. James; Lorna; Mt. Revelstoke; Paul Lake (near Kamloops); Princeton; Salmon Arm; Stanley; Trinity Valley; Vancouver Island (Forbidden Plateau). MONTANA: Glacier National Park (summit of Mt. Brown). WYOMING: Carbon County (Medicine Bow National Forest). WASHINGTON: Mt. Rainier National Park (Freemont Peak and Longmire Springs). OREGON: Crater Lake National

Park; Crook County (Ochoco National Forest); Mt. Hood (Homestead Inn). CALIFORNIA: Eldorado County (Kirkwood Lake).

The specimens identified as belonging to *Syneta simplex* Leconte by Hamilton (1892), from the "mainland off Wrangel" (Alaska) probably belonged to *Syneta pilosa* Brown but Wickham's specimens have not been examined by the author.

Syneta hamata Horn.

Syneta carinata Mannerheim. CROTCH and CANTAB, 1873, page 24 (misidentification).

Syneta simplex Leconte. HORN, 1892, page 3 (misidentification).

Syneta hamata HORN, 1893, page 133.

TYPE LOCALITY: "Washington Territory."

LOCATION OF TYPE SPECIMENS: The Academy of Natural Sciences of Philadelphia.

FOOD PLANTS: Alpine fir, *Abies lasiocarpa* Nuttall; vine maple, *Acer circinatum* Pursh; birch, *Betula* species; hazel, *Corylus;* black-cap raspberry, *Rubus;* also found occasionally on many other plants.

MALE: Cannot be confused with any other species because of the fantastic shape of the hind tibiae (see plate 1) and the very distinctive structure of the aedeagus (plate 2). Also of note is the fact that the posterior margin of the fifth visible ventral abdominal segment is merely undulate, rather than being extended backward in a prominent, truncate, median lobe as it is in all other known species (see plate 1). Length of males is 5.5 to 8.5 mm.

FEMALE: Similar to the male except for the lack of hamate hind tibiae. In females each hind tibia bears two piceous spurs at the tip and the outer edge is strongly expanded backward (plate 1). No other known species has exactly this type of tibial structure. Length of females is 7.5 to 9.5 mm.

GENERAL DISCUSSION: In addition to the characters mentioned above and in the key to the species, the following observations may be useful in the identification of members of *Syneta hamata* Horn: (1) the epipleurae are extremely broad, much more so than

in any other species except *S. ferruginea;* (2) the second and fourth elytral carinae are long and strongly elevated, the first is long but often extremely feeble, and the third is strong but limited to the posterior third of elytra; (3) the side margins of prothorax are armed with three distant, slender, spine-like teeth in every specimen observed by the author; (4) the pronotal disc is densely and coarsely punctured over-all and has a distinctly greasy or waxy luster; (5) the front of head (above and between antennal bases) is sculptured exactly the same as the pronotal disc.

The color variation in both sexes is amazing, the author having examined specimens ranging from uniform pale straw-color to bright rufous over-all or often with just the head and pronotum rufous. Quite commonly they are rufous with light yellowish second elytral carinae and epipleurae, and a few specimens are dark brown with all carinae pale in color. In no other species of *Syneta* was this distinctly striped color variety observed. The pronotum may be uniformly colored or may have the front and rear margins paler.

James A. G. Rehn, curator of insects at the Academy of Natural Sciences of Philadelphia, has kindly supplied the following information concerning Horn's types, which are in the Academy's collection of insects: "Horn did *not* specifically designate any single type but he always said he regarded the individual specimen which held his longhand label as 'the type.' In the case of *Syneta hamata* this is a male from 'W. T.' (Washington Territory). It is A.N.S.P. type number 3761." Mr. Rehn adds that "In addition to the single type, Horn's collection contained nine specimens from 'W. T.', one from 'B. C.', and one from 'mainland opposite Fort Wrangel, Alaska'," and that "the type is a uniform woody brown, but several of the paratypes have paler costae, particularly the intrahumeral one, but none is the 'bright rufous' color."

Three hundred and forty specimens were examined, from the following localities: ALBERTA: Edmonton, Leduc. BRITISH COLUMBIA: Fernie; Lorna; Lumby; Paul Lake; Stanley; Steelhead; Vernon. MONTANA: Glacier National Park (Lake McDonald, Two Medicine Lake, Mt. Brown, Logan Pass, Many Glacier Area). WYOMING: Yellowstone National Park. IDAHO: Bonner County (Coolin, near Priest Lake); Clearwater County (Pierce);

Latah County (Moscow Mountains). WASHINGTON: Clallam County (Forks, Port Angeles); Grays Harbor County (Lake Quinault); King County (Seattle); Kittitas County (Easton); Pierce County (Longmire Springs). OREGON: Benton County (Corvallis, Mary's Peak); Clatsop County (Cannon Beach); Coos County (Coos Head); Jackson County (South Butte Forest Camp, Fish Lake); Klamath County (Klamath Falls); Lake County (Warner Mountains); Mt. Hood (Homestead Inn); Polk County (Valsetz); Wallowa County (Lake Wallowa). CALIFORNIA: Del Norte County (Crescent City); Humboldt County (near Dyerville Flat, Fort Seward, Prairie Creek near Orick, along Van Duzen River); Mendocino County (Comptche); Plumas County (Meadow Valley, Mohawk); Santa Cruz County (Happy Valley); Shasta County (Ono); Siskiyou County (McCloud); Trinity County (Nash Mine); Tulare County (Trout Meadow).

Syneta betulae (Fabricius).

Crioceris betulae FABRICIUS, 1792, page 5; PAYKULL, 1799, page 76; FABRICIUS, 1801, page 462. GYLLENHAAL, 1813, page 644 (in synonymy).

Lema betulae (Fabricius). SCHOENHERR, 1808, page 286; GYLLENHAAL, 1813, page 644 (in synonymy); THOMSON, 1885, page 160.

Orsodachna (?) *betulae* (Fabricius). GYLLENHAAL, 1813, page 644.

Auchenia betulae (Fabricius). DEJEAN, 1821, page 114; ZETTERSTEDT, 1828, page 389; and 1840, page 214.

Syneta betulae (Fabricius). DEJEAN, 1835, page 359; 1837, page 361; and 1837 (3rd edition, revised), page 385; LACORDAIRE, 1845, page 230 (in part); REDTENBACHER, 1874, page 444; THOMSON, 1885, page 160 (in synonymy).

TYPE LOCALITY: Lapland.

FOOD PLANT: Birch, *Betula alba,* Willdenow.

MALE: Distinctive in form and sculpture of the epipleurae, nature of elytral vestiture, and structure of the aedeagus, as mentioned in the key to species. The elytral carinae are similar to those of *S. albida* Leconte, with first carina long but feeble, second and fourth long and strong (the region between them depressed or concave), and third strong but short, being limited to the posterior portion of the elytra. In color these beetles are usually dark brown with the epipleurae, legs, and antennae

golden brown. As in most other species of this genus there is considerable color variation, hence Lacordaire's "variety A" is the testaceous form and his "variety B" is yellowish with reddish-testaceous head and pronotum, while Gyllenhaal's and Zetterstedt's "variety b" has the elytra pale with longitudinal vittae of brown. Length of males is usually about 7 mm.

FEMALE: As mentioned in the key, these beetles differ from females of *S. pilosa* and *S. adamsi* chiefly in the structure and sculpture of their epipleurae. The pubescence of their elytra is quite similar to that of the males. In some respects there is a resemblance also to *S. hamata,* but in *S. betulae* (as in *S. adamsi*) the outer and inner rear margins of the hind tibiae extend backwards an equal distance while in females of *S. hamata* the outer edge is greatly expanded backward. The elytral carinae are similar to those of *S. simplex,* with the first and third ones obsolete, the second long but quite feeble, and the fourth strong anteriorly but faint behind the middle. The females of this species are usually a testaceous or straw color, except for the head and pronotum, which are slightly rufous. Occasionally, however, females occur which have darker colored vittae on the elytra. Members of Lacordaire's "variety A" possess a dark brown body, testaceous antennae and elytra, with brownish sutural stripe and a submarginal vitta of the same color on each elytron. The females of *Syneta betulae* are usually about 7.5 mm. in length.

GENERAL DISCUSSION: Probably this species, if large series are examined, will be found to display the color variations prevalent in other species, from a uniform pale testaceous appearance to a nearly uniform piceous one. In addition to the distinctive decumbent pubescence referred to in the key, specimens of *S. betulae* differ from those of *S. adamsi* in that the epipleurae are *narrowed* into oblivion anteriorly while in *S. adamsi* they are *broadened* into oblivion below the umbone.

Only nine specimens were available for examination, therefore the following locality data include all obvious references to *Syneta betulae* (Fabricius) which have been noted in the literature. Following each locality is mentioned, in parentheses, the names of the principle entomologists who recorded the species from that region. LAPLAND (Fabricius, Lacordaire, Zetterstedt). SWEDEN (Dejean, Paykull, Schoenherr, Gyllenhaal, Lacordaire).

BOTHNIA (Gyllenhaal, Zetterstedt). FINLAND (Heyden). NORWAY (Lacordaire). BOHEMIA (Zetterstedt) (?), AUSTRIA (Redtenbacher) (?).

Syneta adamsi Baly.

Syneta betulae (Fabricius). LACORDAIRE, 1845, page 230 (in part); HEYDEN, 1880–1881, page 197 (misidentification); and 1884, page 284 (in part).

Syneta adamsii BALY,[1] 1877, page 378.

Syneta betulae Paykull. MARSEUL, 1889, page 491 (in part).

Syneta betulae (Fabricius) variety *amurensis* PIC, 1901, page 19.

Syneta adamsi Baly, JACOBY, 1885, page 193; and 1903, page 10. WU, 1937, page 779. GRESSITT, 1942, page 278; and 1945, page 136. [Emendation of *Syneta adamsii*.]

Syneta ussurica BRANCSIK, 1914, page 61.

TYPE LOCALITY: "St. Vladamir Bay, Mantchuria."

LOCATION OF TYPE SPECIMENS: British Museum of Natural History in London.

MALE: In members of this sex, the first elytral carinae are almost completely obsolete, the second are long and distinct but low, the third are distinct only on the apical third of the elytra, and the fourth (humeral) carinae are long and well developed and extend from the umbone almost to the elytral apex. Members of this species are known to exhibit the following color variation among males: (1) black with very dark rufous antennae, legs, and broad mid-elytral stripe ("variety a" of Jacoby), which has also been observed by the author from Mt. Takao, Japan; (2) uniform pale rufous over-all ("variety A" of Lacordaire?); (3) entirely testaceous in color, usually a little paler on elytra than on head and pronotum (*S. betulae* variety *amurensis* of Pic and probably *S. ussurica* of Brancsik). Jacoby (1885) noted that males have the pronotum much longer in proportion to its width than do females and also called attention to the great variation in color, even among specimens from the same locality. Males vary in body length from 4 to 5.5 mm.

FEMALE: The epipleurae of females are much broader than in males. The fourth (humeral) elytral carinae are long and strong

1. This name should not be confused with *Lema adamsii* Baly, which was described from Chusan, China, in 1873 and is still considered as a valid species of *Lema* Fabricius.

but others are all obsolete except near the elytral apex. These females differ from those of *S. betulae* and *S. pilosa* by the characters given in the key, but seem to be closely allied with those populations. All females examined were light testaceous in color (corresponding to Baly's type specimen), although individuals have been reported with faintly rufo-testaceous head and pronotum ("variety c" of Jacoby, "variety B" of Lacordaire [?], and *Syneta betulae* variety *amurensis* of Pic). It is probable that Jacoby's "variety b" was also a female (since only the fourth elytral costa was distinct) and its color was described as fulvous, with the suture and a narrow longitudinal stripe fuscous. Members of this sex of *Syneta adamsi* Baly are about 6 mm. in length.

GENERAL DISCUSSION: Individuals belonging to this species population may be easily distinguished by the nature of the epipleurae, type of elytral pubescence, and structure of the male aedeagus, as set forth in the key to species. The species appears to be most closely related to *Syneta betulae* (Fabricius) of northern Europe and Scandinavia although in many respects it is similar also to *S. pilosa* Brown. The similarity between this species and *S. betulae* is striking. In addition to the characters mentioned in the key, it is of interest to note that in the present species the epipleurae broaden anteriorly into oblivion below the umbone, while in *S. betulae* they are narrowed into oblivion there. The coloration of males may vary from the black-vittate form to a unicolorous testaceous variety in any given geographical locality (Jacoby, 1885) and there is evidently some color variation among females, also, but not so frequently. Specimens from Amur (eastern Siberia) have not been seen by the author but unless they represent a new species they undoubtedly belong to *S. adamsi* Baly rather than to *S. betulae* (Fabricius) as believed by Pic (1901), Lacordaire (1845) and others. The species described by Brancsik (*S. ussurica*) in 1914 is also from Amur (east of Khanka Lake) and almost certainly is merely a color variety of *S. adamsi* Baly, although the specimens have not yet been seen by the writer. Only four specimens were available for examination, therefore the following locality data include all obvious references to *S. adamsi* Baly which have been noted in literature. Following each will be found the name of the persons who made the collections. SIBERIA: St. Vladamir Bay

(Adams); Ussuri (Brancsik). JAPAN: Niohozan, Kiga, Miya, Nikaido (Lewis); Nikko (Gressitt, Lewis); Tsu Sima (Adams); Mt. Takao, Hachioji (Gallois). The material collected by Adams was described by Baly and the specimens contributed by Lewis were discussed by Jacoby (1885). Dr. Van Dyke's collection contains four specimens from Mt. Takao seen by the writer. These are in the California Academy of Sciences in San Francisco.

Syneta carinata Mannerheim.

Syneta carinata (specimen labelled as such by Eschscholtz in his collection prior to 1831 but never published by him).

Syneta carinata Eschscholtz. DEJEAN, 1835, page 359; 1837, page 361; and 1837 (3rd edition, revised), page 385 (nomen nudum); MANNERHEIM, 1843, page 307; LACORDAIRE, 1845, page 229; LECONTE, 1857 (1860), page 24; HORN, 1892, page 3.

Syneta carinata Mannerheim, JACOBY, 1903, page 10; BRISLEY, 1927, page 59; BROWN, 1940, page 39.

TYPE LOCALITY: Sitka, Alaska.

LOCATION OF TYPE SPECIMEN: Zoological Museum of the University of Helsingfors, Finland.

FOOD PLANTS: Alpine fir, *Abies lasiocarpa* Nuttall; mountain hemlock, *Tsuga mertensiana* Sargent.

MALE: In addition to the characters utilized in the key to species, the following features deserve mention: Color tan to yellowish above, usually with the suture, disc of pronotum, and most of the head piceous. (The front and rear margins of the pronotum are normally as pale as the elytra.) Ventral body surfaces are paler, at least in part, but the tips of the femora and the entire tibiae and tarsi are usually quite dark. The coloration varies considerably within the species, hence determinations must be based largely upon morphological differences. The first elytral costa is always evident but is strong only proximally if at all. The second and fourth elytral carinae are well developed and long, but the third is strongly elevated only posteriorly. Members of this sex can easily be identified by the characters in the key. The elytral setae are so short that they barely extrude from their punctures and are consequently hard to see, even under the stereoscopic microscope. This, plus the fact that the

hind tibial tips are distinctly swollen anteriorly, will serve to separate the present species from *Syneta ferruginea* (Germar) of northeastern North America. The species is also frequently confused with *S. pilosa* Brown, but has the elytra decidedly less pubescent and male aedeagus not at all like that of *S. pilosa* (plate 2). Length of males is from 7 to 10.5 mm.

FEMALE: These individuals are usually much paler in color than the males, especially with regard to the ventral surfaces and legs. The intervals between elytral carinae are much less profoundly sunken than they are in males of this species, and the first carina is not nearly so pronounced. The epipleurae are not as broad or flat as they are in *Syneta hamata* Horn, and they lack the slanting interruption found in females of *Syneta pilosa* Brown. Also they differ from *S. pilosa* in being quite glabrous, whereas that species consists of beetles that have very prominently pilose elytra. The clypeus of members of *S. carinata* is flat or even concave (sunken) over-all, being distinctly less elevated than the anterior edge of the frons, while in *S. pilosa* the clypeus is (at least in part) distinctly convex (the portion in the middle and near the frons is always convex, and often the entire clypeus appears swollen). Also it will be noted that the extremely large, smooth, shiny area on the front of the head serves to separate members of *S. carinata* from all other species (*S. pilosa* usually has three more or less isolated smooth areas there). These beetles differ from *S. hamata* by having both outer and inner sides of the hind tibial tip extended backward an almost equal distance, while in females of the latter species the outer side projects back *much* farther than does the inner edge. From the eastern species (*S. ferruginea*) the present individuals differ in the structure of the hind tibiae as well as by possessing more strongly developed elytral carinae and slightly narrower epipleurae. Females are between 7.5 and 12 mm. in length.

Two hundred and nineteen specimens were examined, from the following localities: BRITISH COLUMBIA: Canoe; Eagle River; Fernie; Fort St. James; Garibaldi Park; Mara Mountain; Midday Valley; Mt. Revelstoke; Prince Rupert vicinity; Salmon Arm; Stanley; Trinity Valley; Vancouver; Vancouver Island (Forbidden Plateau). ALBERTA: Crowsnest Pass; Waterton. MONTANA: Glacier National Park (Swiftcurrent Lake, Logan

Pass). UTAH: (no exact locality given). IDAHO: Bonner County (Priest Lake). WASHINGTON: Clallam County (Forks); Grays Harbor County (Humptulips, Lake Quinault); Kittitas County (Easton); Mt. Rainier National Park (Paradise Park, elevation 6,000 feet); Whatcom County (Mt. Baker National Forest, elevation 6,000 feet). OREGON: Jackson County (Fish Lake, Hyatt Lake); Lake County (Warner Mountains); Klamath County (Crater Lake, Lake of the Woods); Mt. Hood (Homestead Inn). CALIFORNIA: Eldorado County (Lake Tahoe, Fallen Leaf Lake, Kirkwood Lake, Mt. Tallac, Echo Summit); Humboldt County (Myers); Lassen County (Facht); Placer County (Tahoe); Plumas County (Meadow Valley); Shasta County (Lassen Volcanic National Park); Siskiyou County (McCloud, Mt. Shasta); Trinity County (Nash Mine). Also occurs in Alaska, at Skagway and on Sitka Island.

Syneta ferruginea (Germar).

Crioceris asparagi (Fabricius). MELSHEIMER, 1806, page 25 (misidentification).

Crioceris flavida MELSHEIMER, 1806, page 25 (manuscript name).

Donacia ferruginea GERMAR, 1811, page 34.

Orsodacna tripla SAY, 1826, page 281.

Orsodacna (Crioceres) asparagi (Melsheimer). SAY, 1826, page 281 (in synonymy).

Orsodacna tripla variety *(Crioceres) flavida* (Melsheimer). SAY, 1826, page 281 (in synonymy).

Syneta rubicunda DEJEAN, 1835, page 359; 1837, page 361; and 1837 (3rd edition, revised), page 385 (nomen nudum).

Orsodachna costata NEWMAN, 1838, page 391.

Syneta ferruginea (Germar). CROTCH and CANTAB, 1873, page 25; HORN, 1892, page 4.

Syneta rubicunda LACORDAIRE, 1845, page 230; CROTCH and CANTAB, 1873, page 25 (in synonymy).

Syneta triplex (Say). CROTCH and CANTAB, 1873, page 25 (emendation of *tripla*) (in synonymy).

Syneta costata (Newman). CROTCH and CANTAB, 1873, page 25 (in synonymy).

Syneta carinata Mannerheim. SCHAEFFER, 1933, page 298 (in part).

Syneta extorris BROWN, 1940, page 165.

TYPE LOCALITIES: *Crioceris asparagi* Fabricius (Melsheimer)

(misidentification of specimen #533 in the F. V. Melsheimer collection), "United States."

Crioceris flavida Melsheimer (misidentification of specimen #532 in the F. V. Melsheimer collection), "United States."

Syneta (Donacia) ferruginea (Germar), "America septentrionali."

Syneta (Orsodacna) tripla (Say), "United States."

Syneta rubicunda Lacordaire, "Boreal America."

Syneta (Orsodachna) costata (Newman), "Trenton Falls, New York" (no locality label on type, but a second specimen, considered by Balfour-Browne to be a cotype, though not so labelled, bears this label).

Syneta extorris Brown, "Clingman's Dome, boundary of North Carolina and Tennessee, at 6,600-foot elevation."

LOCATION OF TYPE SPECIMENS: *Crioceris asparagi* Fabricius [Melsheimer], probably destroyed by dermestids with the Thomas Say collection about 1840.

Crioceris flavida Melsheimer, probably destroyed by dermestids with the Thomas Say collection about 1840.

Syneta (Donacia) ferruginea (Germar), Zoological Museum of Berlin?

Syneta (Orsodacna) tripla (Say), destroyed by dermestids about 1840.

Syneta rubicunda Lacordaire, British Museum of Natural History in London.

Syneta (Orsodachna) costata (Newman), British Museum of Natural History, London.

Syneta extorris Brown, Canadian National Collection in Ottawa.

FOOD PLANTS: Eastern white spruce, *Picea glabra* (Moench); balsam fir, *Abies balsamea* (Linnaeus); Fraser fir, *Abies fraseri* (Pursh) (?); tamarack, *Larix laricina* (DuRoi); speckled alder, *Alnus rugosa* (DuRoi) (*incana* of authors); hop hornbeam, *Ostrya virginiana* (Miller); birch, *Betula;* and hazel, *Corylus.*

GENERAL DISCUSSION: The members of this population display the usual color variations which are so commonly exhibited within species of *Syneta.* In the present case, however, the coloration ap-

pears to be more or less correlated with the environment, perhaps being due in large measure to the food plants involved. Possibly these differently colored specimens will ultimately be proved to be "physiological species" (Brown, in personal correspondence, 1950, expresses belief that cytological analyses may uncover polyploidy in some of the "varieties" and that certain populations [such as "*extorris*"] are at least subspecifically distinct). However, at the present time the writer feels he would be magnifying the significance of current data if he considered them as being anything more than "ecophenotypes" or "physiological subspecies," and believes it preferable to refer to them merely as "varieties" of *Syneta ferruginea* (Germar) until further details are learned concerning their genetic makeup and food-plant associations. It should be noted here as being particularly significant that: (1) each distinctively colored variety displays a marked preference for certain food plants; (2) these varieties are mostly sympatric (their ranges overlap or sometimes even coincide); and (3) occasional individuals (not at all uncommon) are intermediate in color between the various well defined varieties.

One very distinctively colored variety has been described as a species (*Syneta extorris* Brown, which is uniformly black), but intermediately colored individuals have been found in the same general habitat, which seems to link it with the "typical" *Syneta ferruginea* (Germar). The females of "*extorris*" appear to be identical in every way, including coloration, with females of other varieties of *S. ferruginea*. In many species (*Syneta pilosa* Brown, *Syneta albida* Leconte, and so forth) this same uniform black color sometimes occurs. This fact further enhances the viewpoint that color differences alone are valueless taxonomically in the present genus.

Only one of the known color varieties of *S. ferruginea* displays morphological peculiarities, that being the "rufous" variety which has elytral carinae all very strongly developed in the males. The importance of this feature is nullified by the fact that other specimens appear to be intermediate between "rufous" and the "typical" form of *S. ferruginea*, both in color and elytral sculpturing. The author will welcome any knowledge concerning food plants and coloration of members of this group for use in possible future clarification of the problems. More re-

search is definitely required before the members of the *S. ferruginea* complex can be placed with assurance in any logical natural arrangement. It is indeed unfortunate that so many "species" have been described, only to be eventually relegated to synonymy under the name "*ferruginea.*" Otherwise the population could be easily passed over as being one exhibiting the usual color variation and having wide divergence in food preferences. However, because of the many synonyms which have glorified the color varieties with separate names, it is deemed desirable to treat the group taxonomically in so far as is possible with our present meager knowledge, hence the following temporary infrasubspecific disposition is suggested.

Syneta ferruginea (Germar), "typical" variety.

Crioceris asparagi Fabricius. MELSHEIMER, 1806, page 25 (misidentification).

Crioceris flavida MELSHEIMER, 1806, page 25 (manuscript name).

Donacia ferruginea GERMAR, 1811, page 34.

Orsodacna tripla SAY, 1826, page 281.

Orsodacna (Crioceres) asparagi (Melsheimer). SAY, 1826, page 281 (in synonymy).

Orsodacna tripla variety *(Crioceres) flavida* (Melsheimer). SAY, 1826, page 281 (in synonymy).

Syneta triplex (Say). CROTCH and CANTAB, 1873, page 25 (emendation of *tripla*) (in synonymy).

TYPE LOCALITY: "America septentrionali."

LOCATION OF TYPE SPECIMEN: Zoological Museum of Berlin?

FOOD PLANTS: Balsam fir, *Abies balsamea* (Linnaeus); white spruce, *Picea glauca* (Moench); tamarack, *Larix laricina* (Du-Roi); hazel, *Corylus;* oak, *Quercus* (accidental?).

MALE: Elytra ochreous, except for the suture, which is very narrowly brownish. Ventral sclerites of thorax and abdomen are dark brown, the head is dark brown above, and the pronotum is brownish in the center but paler toward front and rear edges. Legs and feet are dark brown except for base of each femur and entire trochanter and coxa, which are even paler than the elytra. Antennae are piceous except for the second and third segments, which are pale ochreous, and the distal half of the fourth segment,

which is only slightly darker. Other specimens of *S. ferruginea* (namely the "mahogany" variety) may closely approach this coloration but many individuals seen had a much darker sutural stripe of varying width. As in other species of *Syneta*, the coloration of *S. ferruginea* appears to be very unstable, resulting in the formation of graded transitions among the varieties. Only one specimen of this sex was seen by the author. It was collected feeding up balsam fir, *Abies balsamea* (L.) at Pleasant Bay, Nova Scotia.

FEMALE: Color is similar to that of the male (or paler) but occasionally with a tendency toward a pale rufous-brownish tint, which trend is always manifested more readily upon the head and pronotum than elsewhere. In addition, the elytral suture is nearly as pale as the rest of the elytra while the legs, feet, and antennae are almost unicolorous pale brownish ochreous and the pronotum is not paler toward the margins. The ventral sclerites are as pale as the elytra, often being distinctly yellowish in part.

GENERAL DISCUSSION: The females of this variety are extremely abundant, while males are evidently quite rare. In size these beetles vary from 6.5 mm. long (males) to 8.5 mm. (females). No food plant was recorded for many of the specimens listed below in the distributional data, but the series loaned by W. J. Brown had several host-plant labels. On this series, the one male (Pleasant Bay, Nova Scotia) and eighteen females (Quebec, New Brunswick and Newfoundland) were discovered feeding upon *Abies balsamea* (Linnaeus); sixteen females (Quebec, New Brunswick, Nova Scotia and Newfoundland) were on *Picea glauca* (Moench); and one female (Newfoundland) was eating needles of *Larix laricina* (DuRoi). In addition to the data listed below, a few references taken from literature are worth noting. Blatchley (1910) records beating specimens (which were females of this "typical" variety) from the foliage of scrub oak (accidental??) and hazel *(Corylus)* in southern Indiana. Procter (Mt. Desert, Maine, 1938) calls attention to "a normal male and a peculiar reddish female taken by sweeping ferns, etc." and adds "Feeds on birch leaves." W. J. Brown (personal correspondence, 1949) states that "I never find specimens in numbers but am convinced that the species I called *ferruginea* . . . feeds by preference and possibly largely or

entirely on *Alnus rugosa, Corylus,* and *Ostrya.* Our forest entomologists take large series from *Abies* and especially *Picea.*" (Subsequent correspondence revealed that Mr. Brown was referring to the author's "rufous-sutured" variety as feeding upon the deciduous trees mentioned, but specimens loaned by him showed that the series from *Abies* and *Picea* actually fit the description of "typical" members of *S. ferruginea* as set down by Lacordaire in his interpretation of Germar's publication.) The Arnprior, Ontario, specimen was more distinctly rufous than any of the others of this "typical" variety, but the three additional specimens from Arnprior were *definitely* the "rufous" variety and were feeding on *Ostrya virginiana* (Miller).

More than fifty specimens were examined, from the following localities: IOWA: Story County (Ames). ILLINOIS: Champaign County (Urbana). INDIANA: southern two thirds of state. MICHIGAN: Marquette. ONTARIO: Renfrew County (Arnprior); Lincoln County (Grimsby): QUEBEC: Pontiac County (Duparquet, Laniel). PENNSYLVANIA: Allegheny County (Allegheny); Dauphin County (Harrisburg); Delaware County (Mt. Alton). NORTH CAROLINA: Black Mountains; Mt. Mitchell. NEW JERSEY: Reyer. NEW YORK: Colden; Hamburg; Niagara Falls; Wallface Mountain. CONNECTICUT: Litchfield County (Cornwall); New Haven County (Short Beach). NEW HAMPSHIRE: Coos County (Pittsburg). MAINE: Washington County (East Machias). NEW BRUNSWICK: Charlotte County (Lepreau Game Refuge); Northumberland County (McNamee, Portage River); Restigouche County (Upsalquitch); St. John County (Bay View, Black River); Victoria County (South Tilley). NOVA SCOTIA: Inverness County (Pleasant Bay). NEWFOUNDLAND: field-note localities only.

Syneta ferruginea (Germar), "mahogany" variety.

FOOD PLANT: Fraser fir, *Abies fraseri* (Pursh).

These beetles fit the general description of males of the "typical" variety; however the regions which are dark brown in that variety are piceous, while the paler areas have become dark mahogany brown, and only the second and third antennal segments are pale. Both sexes occasionally exhibit this dark mahogany coloration but as a general rule the males are darker than the females. A few individuals have the black sutural stripe very

distinct and of variable width. The specimens collected by Dr. E. C. Van Dyke on Fraser fir *(Abies fraseri)* in the Black Mountains of North Carolina are the only ones seen by the writer which possess such coloration. Within this series of four males and six females, a complete gradation in color between the "typical" form of *S. ferruginea* and the "*extorris*" variety occurs. The specimens mentioned as "mahogany" variety are in the entomological collection of the California Academy of Sciences in San Francisco. Length of the specimens observed varies from 5.5 to 6.5 mm.

DISTRIBUTION: The only specimens seen were those collected by Dr. Van Dyke in the Black Mountains of North Carolina, as mentioned above, and that population includes some members which are nearly identical in coloration to Brown's *Syneta extorris* ("extorris" variety of the present publication).

Syneta ferruginea (Germar), "rufous" variety.

Syneta rubicunda DEJEAN, 1835, page 359; 1837, page 361; and 1837 (3rd edition, revised), page 385 (nomen nudum).

Syneta rubicunda LACORDAIRE, 1845, page 230. CROTCH and CANTAB, 1873, page 25 (in synonymy).

FOOD PLANT: Hophornbeam or ironwood, *Ostrya virginiana* (Miller).

TYPE LOCALITY: "Boreal America."

LOCATION OF TYPE SPECIMEN: British Museum of Natural History in London.

MALE: Uniform bright rufous over-all (including antennae, legs, and feet), with elytral carinae much more strongly elevated and with elytral punctures decidedly broader, deeper, and in more distinct serial arrangement than in any other variety of this species. The second and fourth elytral carinae find expression as high, sharp ridges, similar to those on the elytra of *Syneta albida* Leconte. The two males observed by the author were from Reyer, New Jersey, and Jamaica, New York (Long Island), respectively and varied from 5.5 to 6 mm. in length.

FEMALE: Coloration similar to that of the male but usually with a brownish tint. The elytral costae are not so strongly de-

veloped as they are in males, and the punctures are smaller and more widely spaced. Eleven specimens of this sex, from widely scattered localities in northeastern United States, were examined by the writer. They averaged between 6 and 7 mm. in length.

GENERAL DISCUSSION: In addition to the specimens personally observed there is mention of the finding of "a normal male and a peculiar reddish female taken by sweeping ferns, etc." in the Mt. Desert region of Maine (Procter, 1938). This is no doubt also the "rufous" variety, since its color was evidently quite noticeable. Unfortunately, although the males observed are very distinctive in appearance, there is a tendency for females of this variety to shade gradually into the "typical" variety of *S. ferruginea,* some members retaining a very slight rufous tint over-all while in others the reddish tint is limited to the head, pronotum, and antennae (as in the specimens described by Blatchley from Indiana). Mr. Balfour-Browne, of the British Museum of Natural History, has kindly compared a female fitting the above description of "rufous" variety with the type specimen of *Syneta rubicunda* Lacordaire and reports that "the colour is a perfect match and the main difference is that the two internal costae are much less visible than in your specimen." He also observes that "the type of *costata* has the head and pronotum more nearly rufous like *rubicunda.*" (He further states that Lacordaire's type specimen was from the Dejean Museum and was collected in Boreal America by Dr. Leconte. A label on this type says "*Syneta rubicunda* Dej. h. in Amer. bor. Dr. Leconte.")

Mr. W. J. Brown (personal correspondence, 1949) states that "*ferruginea* feeds by preference and possibly largely or entirely on *Alnus rugosa* (*incana* of authors), *Corylus,* and *Ostrya.* It . . . is usualy quite pale, with, if it is the same, an occasional dark specimen (see the three Arnprior specimens found feeding on *Ostrya*)."

The only actual record of a food-plant for this variety is that of the three females from Arnprior, Ontario, which were feeding on *Ostrya.* It seems possible to the author that in this case it may be the food eaten which is responsible for the rufous coloration, hence the specimens which mostly feed upon *Alnus, Betula,* and *Corylus* would be less distinctly rufous.

In addition to the reasons given earlier for believing coloration to be of insufficient significance to allow us to consider all of the color varieties as species or subspecies, the following instances concerning this "rufous" variety may be cited: (1) the Mt. Desert specimen was taken in a sweeping net with a "normal" male; (2) the female from Mt. Uniacke was collected along with four females belonging to the "rufous-sutured" variety; (3) the three Arnprior females were taken with another female which is considered as "typical" of *S. ferruginea* (although it did have a very slight rufous tint); and (4) several other specimens of the "typical" form of *S. ferruginea* exhibited a more or less conspicuous rufous tinge on the head and pronotum. The distinctly rufous specimens with strong carinae comprise the rarest of our *S. ferruginea* varieties.

DISTRIBUTION: NEW JERSEY: Reyer. NEW YORK: Jamaica (Long Island). CONNECTICUT: New Haven County (Short Beach). MAINE: Washington County (East Machias); Hancock County (Mount Desert). ONTARIO: Renfrew County (Arnprior). QUEBEC: Brome County (Knowlton). NEW BRUNSWICK: Westmorland County (Shediac); Gloucester County (Bathurst). NOVA SCOTIA: Hants County (Mt. Uniacke).

Syneta ferruginea (Germar), "rufous-sutured" variety.

FOOD PLANTS: Speckled alder, *Alnus rugosa* (DuRoi) (*incana* of authors); hophornbeam, *Ostrya virginiana* (Miller); birch, *Betula* (probably also hazel, *Corylus*).

MALE: So far as is now known, males never exhibit this "rufous-sutured" coloration.

FEMALE: Twenty specimens were examined, from the localities listed below. All were pale ochreous except for the antennae, top of head, pronotum, and elytral suture, which are more or less rufous in color. These individuals varied from 7 to 8 mm. in length.

GENERAL DISCUSSION: This variety is sympatric with the "typical" form of *S. ferruginea,* but all records available indicate that it feeds only upon the trees mentioned above, while the "typical" variety seems to be restricted to *Abies, Picea,* and *Larix.* It is therefore possible that there are actually at least

two physiologically distinct species involved in the *"ferruginea"* complex. Further collecting is essential for a more satisfactory understanding of the true relationships among these color varieties. The writer believes it likely that "rufous" variety males together with "rufous-sutured" females represent one distinct species, which would validate Lacordaire's *Syneta rubicunda* as a species name. This viewpoint is further supported by the facts that (1) a "rufous" male was collected at Mt. Uniacke with the four "rufous-sutured" females and that (2) distinctly "rufous-sutured" males apparently do not occur.

DISTRIBUTION: ONTARIO: Sudbury County (Sudbury); Carleton County (Ottawa, Merivale). QUEBEC: Brome County (Brome). NEW BRUNSWICK: Northumberland County (Tabusintac). NOVA SCOTIA: Cumberland County (Lower Sackville); Halifax County (Dartmouth, Cow Bay); Hants County (Mt. Uniacke, Newport); Kings County (Kentville).

Syneta ferruginea (Germar), "extorris" variety.

Syneta extorris BROWN, 1940, page 165.

TYPE LOCALITY: North Carolina-Tennessee boundary: Great Smoky Mountains National Park (Clingman's Dome, elevation 6,600 feet).

LOCATION OF TYPE SPECIMEN: The Canadian National Collection in Ottawa.

FOOD PLANT: Probably Fraser fir, *Abies fraseri* (Pursh).

MALE: Coloration is similar to "typical" and "mahogany" varieties, but with distinctly black elytra, ventral sclerites, top of head, and most of pronotum. The pronotum is very slightly browner toward the front and rear margins. The second and third antennal segments are pale brown-ochreous, while the coxae, trochanters, and base of each femur are rather pale yellowish in color. Length of males is about 6 mm.

FEMALE: These individuals are apparently identical with those of the "typical" form of *S. ferruginea* and with pale females of the "mahogany" variety. Length is 6.5 mm.

GENERAL DISCUSSION: Two pairs of paratypes of the species

"*Syneta extorris* Brown, upon which this variety is based, were examined by the author. Brown's species was described on the basis of color differences between males of this population and those of "typical" form of *S. ferruginea*. Since the black color shades very gradually through the "mahogany" variety into the typical coloration, it seems advisable to reduce the name to varietal rank until the true nature of all of these populations has been determined. The writer feels that this southern Allegheny Mountain Range form may eventually prove to be a physiological subspecies which feeds largely or entirely upon Fraser fir, as contrasted with the more northern (and paler) individuals which eat the needles of Balsam fir and white spruce. For the present, however, in view of our lack of sufficient ecological and physiological information concerning this population, it is deemed wisest to consider it merely as a variety.

DISTRIBUTION: Unknown at present from any locality other than the type locality, although Van Dyke has collected specimens of the "mahogany" variety in the Black Mountains of North Carolina which were nearly as dark as the "extorris" variety.

Syneta albida Leconte.

Syneta albida LECONTE, 1857 (1860), page 66.

Syneta suturalis LECONTE, 1859, page 90 ("piceous-sutured" variety of *S. albida*, from "Puget Sound").

TYPE LOCALITY: Probably near Steilacoom, Washington.

LOCATION OF TYPE SPECIMENS: Three cotypes in the Museum of Comparative Zoology at Harvard, in the Leconte Collection. No others known.

FOOD PLANTS: Willow, *Salix;* dogwood, *Cornus;* alder, *Alnus;* vine maple, *Acer;* plum, cherry, and peach, *Prunus;* quince, *Cydonia;* pear, *Pyrus;* currant, *Ribes;* and many others. (This species is commonly called the "western fruit beetle.")

MALE: The characters used in the key to species are sufficient for positive identification, in addition to which the aedeagus alone is infallible in the separation of *S. albida* from all other species except *S. seriata* Leconte. From *Syneta simplex* Leconte these

males differ by being much less pubescent, with the recumbent hairs of the elytral *punctures* not protruding far enough to be prominent. The sparse setae along the elytral carinae, however, are extremely long, strong, and erect. On undamaged (unrubbed) specimens there are more than fifteen of these erect hairs along each second and fourth carina, as well as several on each first and third carina. These hairs are slightly longer than the width of the epipleura. The antennal bases are closer together than the first antennal segment is long and the space between them is abruptly elevated into a nearly smooth, glossy, transverse bunker. Above this bunker, on the front of the head, is a narrow, smooth, longitudinal elevation among the coarse punctures there, which is usually prominent and shiny and extends upward almost to a roughly circular region of coarse, widely separated punctures between which are flat, smooth areas. In addition to these characters the epipleural and sutural elevations are connected, their union being effected by means of a strongly elevated rim around each elytral tip. This apical ridge is impunctate and usually identical in height and width with the lateral epipleural rim. Also, all of the males observed had the apexes of the antennal segments three to eleven, inclusive, darker (usually very abruptly and prominently so), imparting a distinctly annulate appearance. This is rarely apparent in females of *S. albida* and was never seen in either sex of *Syneta seriata* Leconte. The antennal segments are stout and long, with the tip of each segment usually slightly but abruptly bulging and the seventh segment about the same shape as the first six. A further aid in separating males of *S. albida* from those of *S. seriata* (which they resemble in almost every detail) is the fact that the latter have the head largely a very bright rufous color and the pronotum wholly or mostly jet black. Also, in *S. seriata* the area between the second and fourth elytral carinae is not noticeably sunken or depressed (being obviously flat or a little convex, especially in the mid-abdominal region of the body) while in typical members of *S. albida* the elytra are relatively more slender and have a distinctly sunken area between the above-mentioned carinae. An excellent character for separating the males of *S. albida* from those of *S. seriata* is the structure of the epipleurae. In *S. albida* the epipleurae are uniformly broad from the humeral region almost to the elytral tip, thence taper

abruptly to the apex. Along each epipleura is a distinct row of large punctures which continues posteriorly to a point far behind the middle, usually fading out near the region of the middle of the fourth ventral abdominal segment. Also, the inner edge of each epipleura is a prominent, sharp ridge which persists entirely or nearly to the elytral apex. (See discussion of males of *S. seriata* for full description of epipleurae of those individuals.) Length of males varies, from 5 to 6.5 mm.

FEMALE: These beetles are most easily identified by the type of pubescence, the elytral sculpture, and the nature of the epiplurae and the front of the head. As is the case with males, they are usually smaller than *S. simplex* specimens and much paler in color, in addition to which they have only two lengths of elytral pubescence, similar to the type of vestiture described above for the males except that all pubescence is slightly shorter and less conspicuous and the carinal hairs are sometimes less numerous (*S. simplex* members usually have at least three different lengths of hair on the elytra, *most* of which are erect and conspicuous). It is often a difficult task to separate females of *S. albida* from those of *S. seriata,* hence the following general characters may be worth recording here: The antennae of females of *S. albida* are rather close together at their bases (less than half the length of the first antennal segment apart) and between the bases is a prominent transverse bunker, almost like that of the males, with very sparse punctation and with plenty of smooth, flat spaces between the punctures. (Females of *S. seriata* have antennal bases a variable distance apart and the region between bases is little, if at all, elevated and is customarily punctured just as densely as the adjacent front of the head above the bunker.) Each antennal segment is long and slender but rather abruptly swollen at a point near its apex. The seventh antennal segment is not prolonged anteriorly as it is in *S. seriata* females. In *S. albida* there is almost always a narrow but distinct shiny, smooth, longitudinal elevation among the punctures above the bunker and usually also a little higher on the head is a flat, smooth area with coarse punctures. (In *S. seriata* the longitudinal elevation has never been observed by the author and the higher smooth area is reduced in size, often being nearly entirely absent.) Also, the elytra of *S. albida*

females are flat or even very slightly sunken in some intercostal regions, while those of *S. seriata* females are more or less convex, having a rather swollen appearance. Owing to this difference the females of *S. albida* seem longer and more slender over-all than those of *S. seriata*, which appear short, stubby, and particularly broadened and convex behind the middle, imparting a "pregnant" appearance. Females seen were mostly uniformly pale in color, but a few members (from northern California) were brown with paler elytral carinae and the antennae more or less distinctly annulate. The epipleurae of females are nearly identical with those of males, which also helps to separate them from *S. seriata* specimens. Length of females is 5.5 to 7 mm.

GENERAL DISCUSSION: In spite of the great variety of food plants listed above, and their wide distributional range (which extends to central California), no records are known to the author of *S. albida* ever being found on oak or of *S. seriata* ever feeding upon any plant other than live oak trees. In the region of San Francisco and the Bay Area *S. albida* is extremely rare, but several specimens observed from there and from central California were very distinctly members of this species (no evidence of intergradation between this population and *S. seriata* was noted). The character of the raised edge around the elytral tips is not always reliable, since it is sometimes feeble, even in true *S. albida*. However, if this elevated continuance of the epipleural rim *is* evident around the tip of the elytra as a *very* prominent ridge which unites the epipleural rim with the sutural ridge, then the specimen is certainly *S. albida* instead of *S. seriata*.

True *S. albida* exhibits a profound range of coloration, from extreme albinistic over-all (with black eyes) to uniform piceous or dusky. Many specimens (*Syneta suturalis* Leconte) are pale except for a prominent sutural stripe of black. The numerous color differences common in the various populations of *Syneta albida* might be acknowledged by recognizing the following color varieties[1]: "typical" *albida*, which is uniformly straw-colored; "albinistic" variety, consisting of very pale, powdery-appearing

1. According to the author's present conception, populations whose members differ distinctly in appearance and/or behavior from those of other populations in the same species, but which are connected with these other populations by clines of variability, should be considered as infrasubspecific categories rather than subspecies.

or translucent specimens (mostly females from Washington, Oregon, and British Columbia); "piceous-sutured" variety, composed of males of the "albinistic" variety and being white except for a distinct black elytral suture and usually also a black pronotal disc and black tips on antennal segments three to eleven; "melanistic" variety, members of which are morphologically identical with the "albinistic" variety but are black or very dark brown in color (black specimens from the Olympic Peninsula of Washington and brownish ones from northwestern California); and "vittate" variety, comprising those specimens which are similar to the "melanistic" variety but have the elytral carinae distinctly paler in color. The melanistic specimens from Crescent City, California, and the vittate ones from Humboldt County, California (collected by A. T. McClay in large numbers), are also characterized by their extremely annulate antennae, the basal half of each segment being pale yellow and the distal half abruptly black. A small, black specimen from Port Angeles, Washington, has the basal antennal segments annulate and the remainder solid black. No intergrades were seen except between the "typical" form of *albida* and the "melanistic" variety, and between the "melanistic" and "vittate" varieties. The frequent tendency toward annulate antennae (particularly among males) will often serve to separate *S. albida* from *S. seriata*, members of which have never been seen to have such light and dark bands around their antennae!

The sunken or depressed area between the second and fourth elytral carinae will separate members of *S. albida* from those of *S. simplex* and also from *S. seriata*, both of which are more evenly convex above. Also of value in cases of doubt is the nature of the elytral vestiture, as described under the male and female descriptions above. In the *"albida-seriata"* complex the intervals between the elytral punctures are narrower, not so conspicuously flattened, and are usually in a very distinct serial arrangement, whereas *S. simplex* members have the intervals broad and flat, hardly any serial arrangement of punctures on the elytra, and the punctures are usually large and faint and are separated by a distance almost as great as their diameters. Also, the elytral costae of specimens of *S. simplex* are flattened, except for the humeral one, while in *S. albida* and *S. seriata* they are all usually somewhat elevated and ridge-like.

Two hundred and seventy-six specimens were examined, from the following localities: BRITISH COLUMBIA: Capilano Canyon (Vancouver); Ladner; Midday Valley; Nanaimo (Vancouver Island); Pender Harbor; Spious Creek; Sumas Prairie (Fraser Valley); Vancouver; Victoria (Vancouver Island). WASHINGTON: Clallam County (Forks, Port Angeles); King County (Baring, Seattle); Kittitas County (Easton); Pierce County (Puyallup); Skagit County (Burlington); Snohomish County (Monroe). OREGON: Benton County (Corvallis, Mary's Peak); Clatsop County (Cannon Beach, Olney); Coos County (Hauser); Lincoln County (Newport, Waldport); Multnomah County (Portland); Washington County (Hillsboro). CALIFORNIA: Alameda County (Oakland Hills, on Dogwood); Contra Costa County (Moraga Valley); Del Norte County (Crescent City); Humboldt County (Prairie Creek); Santa Clara County (Mt. Hamilton); Trinity County (Nash Mine, 5,000-foot elevation).

Syneta seriata Leconte.

Syneta seriata LECONTE, 1859, page 90.

Syneta albida Leconte. HORN, 1892, page 5 (in part).

Syneta simplex Leconte variety *minuta* BRISLEY, 1927, page 60.

TYPE LOCALITY: "California."

LOCATION OF TYPE SPECIMEN: One female in the Museum of Comparative Zoology at Harvard.

FOOD PLANTS: California live oak, *Quercus agrifolia* Née; California black oak, *Quercus californica* (Torrey) Cooper.

The variety *Syneta simplex minuta* described by Brisley is actually much more similar to *Syneta albida* Leconte than it is to *Syneta simplex* Leconte, although its food plant and general appearance of the males to the naked eye might easily lead one to believe it closely allied with *S. simplex*. The male genital appendage is identical in structure with that of *S. albida* and not at all similar to any variety of *S. simplex*. Leconte's type specimen of *Syneta seriata* is in the collection of the Museum of Comparative Zoology at Harvard and cannot be loaned for examination. Because of its small size and its California collection locality (by Mr. Rathvon), it aroused the author's suspicion. Dr. P. J. Darlington, Jr., of the Museum was gracious enough to compare this specimen rather carefully with typical specimens

of both *S. albida* and *S. simplex minuta,* with particular attention to the six chief distinguishing characters. It is a female and agrees with Brisley's *S. minuta* in every way except that it does have a distinct elevated bunker between the antennal bases (although this region is densely punctate, which is definitely characteristic of *S. minuta*) and that the second elytral carina is visible. These characters are not sufficient to discredit the specimen as being of the same population as *S. minuta,* and although the type must be examined personally before absolute identity can be established, the writer is inclined to agree with Dr. Darlington that it in all probability represents the same population as does Brisley's *S. minuta.* Therefore the name *Syneta seriata* Leconte is hereby resurrected as valid and assumed to embrace the small central California specimens discussed below.

MALE: Sufficient characters are mentioned in the key to afford identification in most cases. The aedeagus of *S. seriata* males is unlike that in any other species except *S. albida.* From *Syneta simplex* Leconte these males differ by appearing less pubescent and by having elytral punctures distinctly serial in arrangement, with each puncture separated from its neighboring anterior and posterior puncture by a distance of about one-fourth the average puncture diameter. The seta in each elytral puncture is about as long as each epipleura is broad but is decumbent and extremely difficult to see. The second and fourth elytral carinae bear several long, semi-erect setae (usually not more than ten each) which are two or three times as long as each epipleura is broad (these hairs are easily rubbed off and poorly handled specimens sometimes have most of them missing). Males of *S. seriata* may be distinguished from those of *S. albida* because the antennae arise even closer together in many cases, there is not the *extremely* elevated transverse bunker between their bases, and the region between the antennal bases is densely pitted (at least in the middle) with small punctures. In addition, there is seldom any trace of a longitudinal elevation on the frons, but rather there is normally a single circular elevation which is small and smooth and located in the center of the frons between the eyes. The ridge around the tip of each elytron in *S. albida* is absent or greatly diminished in most specimens of *S. seriata* but occasionally this character proves worthless. The

antennae usually have segments one to seven equal and thick while the remaining segments are definitely dwarfed. These antennae do not exhibit the distinct annulate appearance seen in many members of *Syneta albida,* and each segment is gradually dilated, rather than being abruptly swollen near its tip. A general character which is often useful in determining males of *S. seriata* is the distinctive coloration of most of them. They usually have the head bright rufous in color and the pronotum mostly or entirely jet black, while males of *S. albida* never have been seen to approach this condition. Also, the area between the second and fourth elytral carinae is not so noticeably sunken as it is in *S. albida* males (except somewhat in the anterior third), and the over-all length and width of *S. seriata* specimens is normally much smaller than any other known species, although a few of the small *S. albida* males may approach their diminutive size (about 4 to 5 mm. in length).

Female: Of all the problems encountered in the study of *Syneta* the most difficult is the separation of females of *S. seriata* from those of *S. albida.* They may usually be recognized by the fact that they occur on oak foliage in company with the minute brown-headed males just described. Also, *S. seriata* females have a short, broad, stubby appearance, being especially swollen behind the middle of the elytra. This results in a distinctive "pregnant" appearance quite unlike that of the females of *S. albida.* Because of the broader elytra, the rows of elytral punctures are a little further apart than in males, but within each row it will be noted that (like *S. albida*) the punctures are separated by distances of no more than half the diameter of a puncture. This helps distinguish them from *S. simplex* specimens, which have punctures almost entirely without serial arrangement and separated from one another by a distance almost that of the average puncture diameter. (The punctures referred to in this comparison are those between the humeral carinae and the elytral suture about halfway back on the elytra.) In females of *S. seriata* the only elytral carinae which are prominent are the fourth (humeral) ones, while females of *S. albida* normally have the second carinae also well developed. The hairs of the elytral punctures in this small species are so short that they scarcely extrude from the punctures and are also quite decum-

bent and nearly invisible. As in the males, however, there are a few long, slender, erect setae arising from the elytral carinae (these are easily rubbed off and may not be present in all preserved specimens). The antennae arise about as far apart as the first segment is long, and there is usually no abrupt, prominent transverse bunker between them. The area between the antennal bases is densely pitted (at least in the middle) with small punctures similar to those on the adjacent front of the head. Above this interantennal region the small punctures are of nearly uniform density almost to the occiput, surrounding a small, smooth, round elevation located in the center of the frons between the eyes. (There is no narrow, longitudinal elevation below this point as in *S. albida.*) The elytral tips are like those of the males and usually will serve as good diagnostic characters for separating these beetles from *Syneta albida* specimens. The antennal segments are even more slender than in *S. albida* females and are not abruptly swollen at their tip as in that species. The seventh antennal segment is distinctive, however, in that it is definitely thicker than those preceding it and the distal front edge is noticeably prolonged, extending much further than the distal rear edge. The color of the females is usually pale testaceous to pale rufous except for the disc of the pronotum, which is mostly brown or rufous (paler along front and rear margins) and the head, which is customarily pale brown. The appendages are the same color as the elytra but the ventral sclerites and very narrow elytral suture may be slightly darker. These females do not exceed 5 to 5.5 mm. in length. (In *Syneta albida* Leconte some females of the "albinistic" variety are 5.5 to 6 mm. long while other varieties may be as much as 7 mm. in length.) Unfortunately, neither color nor size are reliable characters in the identification of *Syneta* species and there is little doubt that exceptions to the data just set down will occur.

General Discussion: In addition to the qualities discussed for each sex, it will be found that all members of the species possess characteristic epipleurae which will separate them from members of *S. albida.* In *S. seriata* this structure is narrower and less horizontal and begins tapering behind the mesothorax, becoming so slender that the row of epipleural punctures never extends beyond the region of the second abdominal segment. Un-

fortunately, specimens must be at hand for comparisons since this difference is quite subtle and defies adequate description. If known specimens of both populations are examined, however, this character may be definitely observed and recognized with ease for a short time thereafter.

Summarizing, *S. seriata* and *S. albida* are separable on the basis of size, color, elytral shape, type of elytral vestiture and sculpture, structure of antennae and their distance apart, punctation of front of head, and the appearance of the epipleurae.

The males found on black oak are colored similarly to those feeding upon live oak, but many females from black oak are distinctly reddish over-all, including those from Mt. Hamilton, Red Bluff, and Sequoia National Park. The general distribution of *Syneta seriata* corresponds to the range of the two species of host plant, with those around the Bay Area occurring on *Quercus agrifolia* and those of the San Joaquin Valley and Sierra foothills being found only on *Quercus californica.*

Three hundred and forty-seven specimens were examined, from the following localities: CALIFORNIA: Alameda County (Alameda, Berkeley, Leona Heights, Niles Canyon, Piedmont); Amador County (T_7N $R_{15}E$); Butte County (Big Bend Mountain, Chico, Davis, Oroville, Pentz); Calaveras County (Angels Camp, Mokelumne Hill); Contra Costa County (Clayton, Moraga Valley, Mt. Diablo, Muir, Walnut Creek); Humboldt County (Fort Seward, Green Point); Kern County (Glenville); Marin County (Cypress Ridge, Fairfax, Mill Valley, Mt. Tamalpais, Ross); Mendocino County (Laytonville); Monterey County (Bryson, Paraiso Springs); Napa County (Mt. St. Helena); Placer County (Colfax, Newcastle); San Francisco County (Elk Grove, San Francisco); San Mateo County (Half Moon Bay, San Andreas Lake); Santa Clara County (Los Altos, Mt. Hamilton near summit, Saratoga, Palo Alto, San Jose, Silver Creek Hills, Stevens Creek Reservoir); Santa Cruz County (Mt. Madonna, Santa Cruz, Santa Cruz Mountains); Sequoia National Park (Ash Mountain at 1,000 feet, Potwisha at 2,000 feet); Solano County (Green Valley, Putah Creek Canyon); Sonoma County (Cazadero, Glen Ellen, Santa Rosa); Sutter County Marysville Buttes); Tehama County (Red Bluff); Tulare County (Colony Road at 2,500-foot elevation), Kaweah.

Syneta simplex Leconte.

Syneta simplex Leconte, 1857 (1860), page 66; Horn, 1893, page 133; Brisley, 1927, page 60.

Type Locality: Steilacoom, Oregon Territory (now in Pierce County, Washington).

Location of Type Specimen: Two apparent cotypes (with Leconte's handwritten labels) in the Museum of Comparative Zoology at Harvard. (No others known.)

Food Plants: Garry oak, *Quercus garryana* Hooker; alpine fir, *Abies lasiocarpa* Nuttall.

Male: The characters mentioned in the key and illustrated in the plates are sufficient for identification of males of *Syneta simplex*. The appearance of aedeagus is especially valuable in separating them from similar species. Also, the tip of the fifth visible ventral abdominal segment has the truncate prolongation a little narrower than that of *Syneta albida* (in which it is broader than long). Males of "typical" *Syneta simplex* (from northern California, Oregon, and Washington, feeding on Garry Oak) have the short elytral hairs (arising from punctures) at least half as long as the longest hairs (arising from elytral carinae), and semierect. Those males found on Garry Oak in the Santa Cruz Mountains and Marin County, California, are distinctively different because of the very long, erect elytral hairs of the carinae, which are about three times as long as those arising from the elytral punctures. Also, the pronotum is at least as long as broad and the aedeagus is always undulate beneath in specimens from the latter two localities (a condition which is at present unknown among the variable aedeagi of other *S. simplex* populations). It is therefore deemed desirable to recognize this population as the "undulate" variety because of the peculiar aedeagal structure. Possibly it is actually deserving of subspecific rank, but in view of the paucity of detailed information concerning the habits of *S. simplex* in Trinity and Plumas Counties (where certain individuals have been collected which appear to be intermediate between the "undulate" variety and the typical form of the species) no such treatment seems justifiable at present.

Female: The key characters are sufficient to identify females

of this species. The very prominent hair arising from each elytral puncture, and the broad distance between the antennal bases are the principal characters used in separating this species complex from the "*albida-seriata*" complex. The elytral costae are more greatly reduced than in the males, with even the humeral one occasionally being entirely undiscernible. Females of "typical" *S. simplex* populations have all elytral hairs semierect and of nearly equal length, while in the "undulate" variety (see discussion of males of *S. simplex*) the hairs of the elytral carinae are about twice as long as those arising from the elytral punctures.

General Discussion: In the light of our present knowledge concerning the habits of the "typical" form of *S. simplex* it seems likely that Dr. Suckley collected it (in Steilacoom) on Garry oak, since it has apparently never been found feeding on any other host plant at *low* elevations. As mentioned above, there is a distinctive population of *S. simplex* found near San Francisco which differs sufficiently in elytral vestiture and aedeagal shape to be considered as a variety of *S. simplex*. For this population the varietal name "undulate" is proposed. All members of the *Syneta simplex* Leconte complex have a more densely hairy appearance than those of *S. albida* and *S. seriata,* because of the more prominent hairs extruding from the elytral punctures. The elytra are elongate and slender, with parallel sides and with the upper surfaces evenly convex. All elytral "carinae" except the humeral one are only very faintly represented as narrow, smooth, flat lines between the elytral punctures. The following observations may be offered as supplemental aids in species determination. All specimens of *S. simplex* observed had the outer five antennal segments jet black and the basal three or four segments very pale yellow (no segments were annulate, however, which instantly eliminates many specimens of *S. albida* from inclusion here accidentally). Elytral punctures are separated by rather broad, smooth intervals, with most serial punctures being separated from one another by a distance of more than half of their own diameters. (In *S. albida* and *S. seriata* the punctures are deeper and not separated by more than about a fourth of the diameter of each puncture.)

There are two distinctly different subspecies of *Syneta sim-*

plex and numerous local varieties which are distinguishable by structural as well as geographical and physiological peculiarities. Under the discussions above of the male and female one easily recognizable population ("undulate" variety) was described, while several others have been ignored because of incompletely established differences. But the most strikingly different population seen is that which dwells in the northwest (Washington and British Columbia) at elevations near timberline. This is at least a physiologically isolated subspecies and probably will ultimately prove to be a valid species. Such disposition, however, awaits much more intense ecological and physiological study. Evidently the species, *S. simplex,* is at present experiencing a rapid divergent evolution which has thus far led to the relative isolation of several more or less distinct populations. This is emphasized by the fact that aedeagal studies of dozens of specimens revealed a vast degree of variation, ranging from extremely blunt-tipped aedeagi to those with prolonged tips and undulate ventral surfaces. At present it is impossible to find any good basis for new species in this genitalic variation, since there are numerous intergrades between most of the distinct types of *S. simplex* aedeagi. This is of special significance since no other species of *Syneta* is known to exhibit any variation in aedeagal structure within the species! After a few dozen males had been dissected and examined, at least three subspecies (or species) were thought to exist, but continued study of examples from all parts of the Pacific Coast has revealed numerous intermediates between all these save two. At present the specimens usually placed in *Syneta simplex* Leconte but which feed on alpine fir as adults, appear to be distinctly isolated from those which eat oak foliage, with no evident intergradation. This population is therefore described below as a new subspecies of *Syneta simplex* Leconte.

One hundred and fifty-four specimens of *S. simplex* (in the strict sense) have been examined, from the following localities: WASHINGTON: Clallam County (Forks, Port Angeles); Grays Harbor County (Humptulips); King County (Seattle, Baring); Kittitas County (Easton); Mt. Rainier National Park (Longmire, Paradise Valley). OREGON: Benton County (Corvallis); Clatsop County (Cannon Beach); Jackson County (Butte Falls, Fish Lake); Klamath County (Lake of the Woods); Mt. Hood

(Homestead Inn); Polk County (Valsetz). CALIFORNIA: Del Norte County; Humboldt County (Mad River Mountains); Lassen County (Facht, Norval Flats); Marin County (Lagunitas, Mill Valley, Muir Woods, Mt. Tamalpais); Mendocino County (Comptche, Fort Bragg, Pygmy Forest); Modoc County (Warner Mountains); Plumas County; San Mateo County (Crystal Lake, Portola State Park); Santa Cruz County (Corralitos, Ben Lomond, Crystal Lake, Santa Cruz, Santa Cruz Mountains, Soquel); Shasta County (Lassen Volcanic National Park, Kelly's Resort); Siskiyou County (east side of Mt. Shasta); Sonoma County (Duncans Mills, Guerneville); Tehama County (Mineral); Trinity County (Big Flat, Carrville, Coffee Creek, Nash Mine at 5,000-foot elevation). The specimens assigned to *Syneta simplex* Leconte by Hamilton (1892), from the "main land off Wrangel" (Alaska), probably belonged to *Syneta pilosa* Brown although Wickham's specimens have not been examined by the author.

Syneta simplex subalpina Edwards, new subspecies.

The male genital appendages have thus far all been nearly identical in specimens from alpine fir localities and the color of the elytra in every specimen examined was distinctly opaque, looking somewhat like an enamel surface. (All other specimens of *S. simplex* seen had a luster quite similar to that of a mass of ear wax.) This difference is rather obvious if the specimens are viewed from a distance of about a foot or two but becomes useless under microscopic examination. The aedeagus is always obviously abbreviated at the tip and never undulate beneath beyond the apical fifth as it is in the "undulate" variety (which this subspecies resembles in many ways). A more satisfactory difference than coloration is found in the nature of elytral vestiture, which in *S. s. subalpina* is very similar to that of the "undulate" variety from Santa Cruz County and Marin County, California. Males have numerous very long hairs on the carinae, each being about three times as long as the hairs projecting from the elytral punctures, while females have the long carinal hairs only about twice the length of those in the punctures. All elytral hairs of both sexes are about halfway erect and are rather silky in appearance, hence quite different from those of *S. albida*

and *S. seriata.* In typical specimens of *S. simplex* from the valleys near the habitat of *S. s. subalpina,* males have the longest hairs only twice the length of the short ones, while on females all elytral hairs are semierect and nearly equal in length.

Thirty-eight specimens were examined, from the following localities: BRITISH COLUMBIA: Emerald Lake; Emerald Mine; Fernie; Lorna; Lumby; Mt. Revelstoke; Salmon Arm; Stanley; Steelhead; Trinity Valley; Vernon. ALBERTA: Edmonton; Leduc. MONTANA: Glacier National Park. WYOMING: Yellowstone National Park. IDAHO: Bonner County (Priest Lake). WASHINGTON: Mt. Rainier National Park (Van Trump Park, Paradise Park). OREGON: Mt. Hood.

The specimens upon which this subspecies is based are mostly in the collection of the California Academy of Sciences in San Francisco, although a few are in the possession of the writer.

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