The Chauliognathini of America North of Mexico[1] (*Coleoptera-Cantharidae*)

Part 1

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THE GENUS Chauliognathus is the only member of the tribe Chauliognathini found in North America. It attains its majority in the neotropical regions where Champion recognizes some 40 species in his revision of the Mexican and Central American Chauliognathini in 1914. At the time of his study, Champion saw fit to place in synonymy a few North American species for reasons that I consider inadequate. The present study, with adequate descriptions and drawings of the male aedeagi, should cover the genus in North America as I understand it.

I originally intended to include rather thorough studies of variation within the species. This would result in too bulky a paper, so it was deemed feasible to remove the work on variation and publish it as a separate study, using minimum space in the present study so that my concepts of the different species would be understood.

The North American species of Chauliognathus were last reviewed in 1881 by LeConte in a very brief key. In his synopsis, LeConte recognized 10 species. Six additional species have since been described by Fall, Horn, Schaeffer, and Fender. In the present work, 18 species and two subspecies are recognized. *Chauliognathus vittatus* Schaeffer is reduced to a subspecies of *C. lewisi* LeConte and *C. texanus* Fender a subspecies of *C. discus* LeConte.

Miskimen (1961) separated the Chauliognathini and lechthyurini from the Cantharidae, uniting them to form his new family Chauliognathidae. He offers some pertinent reasons for this separation. I feel, however, that this division is too great; that the continued acceptance of these groups as subfamilies or tribes of the Cantharidae is to be preferred. Dr. M. H. Hatch orally suggested an even further combination of families for use in Volume 3 of his Beetles of the Pacific Northwest. He thought to combine the so-called Lampyriform beetles into the family Lampyridae, reverting to the concept of LeConte (1881). This would have included the Lycidae, Lampyridae, Phengodidae, and Cantharidae as well as the new Chauliognathidae of Miskimen.

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To promote brevity, a complete generic description is offered, including rather superficial characters common to most of our species. Divergence by any species will be noted in the description of that species. This will void the continued repetition of these characters throughout the text.

I feel that a new specific name should be first introduced in connection with the original description. The first citation in an abstract or an anteriorly placed key improperly introduces a new name remote from the description. For this reason, a key to species follows the main text of the study.

Tribe Chauliognathini

Head elongated, maxillary lobe with a long extensible membraneous filament; mentum elongate slender, broadened in front; gular sutures confluent for nearly their entire length; prosternum feebly developed, separated by membranes from surrounding parts, gular plates at anterior margin of prosternum large, prominent, and perpendicular; abdominal tergites 1-7 each with a circular pit at the outer apical angle of reflexed lateral margin, tergite 8 simple; last sternite of male elongate oval, convex, more strongly sclerotized, forming an aedeagal cap; aedeagus of male with stout twisted median lobe, lateral lobes asymmetric and rigid.

Chauliognathus Hentz

Chauliognathus; Hentz, 1830, Trans. Am. Phil. Soc., 3 (new series), pp. 460-461. LeConte; 1881, Trans. Amer. Ent. Soc., IX, p. 43; Gorham, Biol. Centr.-Am., Coleopt., III, 2, pp. 68 (1881), 277 (1885); Champion, 1914, Trans. Ent. Soc. London, I, p. 133.

Antennae elongate, filiform to subfiliform in both sexes in our species; elytra parallel sided or apically narrowed to apically subulate, species ochreous to rufous with black markings; head as wide as to much narrower than the pronotum; pronotum subelliptical to transversely suquadrate, anterior margin usually widely explanate, anterior angles rounded, sides more or less widely deeply reflexed, the margins arcuate, straight or feebly sinuate, the bottom of the lateral declivities angulate or rounded, margins usually shining, the discal area transversely convex, shining and smooth to opaque and finely scabrose, very minutely confusedly punctate; elytra rather coarsely confusedly punctured basally, usually becoming rugulose to scabrose apically, the apices individually rounded; body beneath more finely closely punctured; legs long and slender; pubescence aureous to cinereous, fine, rather short and inconspicuous (except as viewed tangentally) above and on the abdominal sternites, longer, thicker, and more conspicuous on the legs and thorax beneath; last sternite of male elongate and cup-shaped to fit the conformation of the aedeagus, recognized herein as the aedeagal cap; aedeagus of male trilobed; median lobe stout and curved or bent inwardly, more or less widely lipped beneath at the apex; left lateral lobe usually stout basally, becoming narrowed at the middle, apical portion curved with the tip more or less hooked and acute; right lateral lobe stout basally, more or less slender and usually bent outwardly at or beyond the middle, the apex blunt; or acute and not hooked.

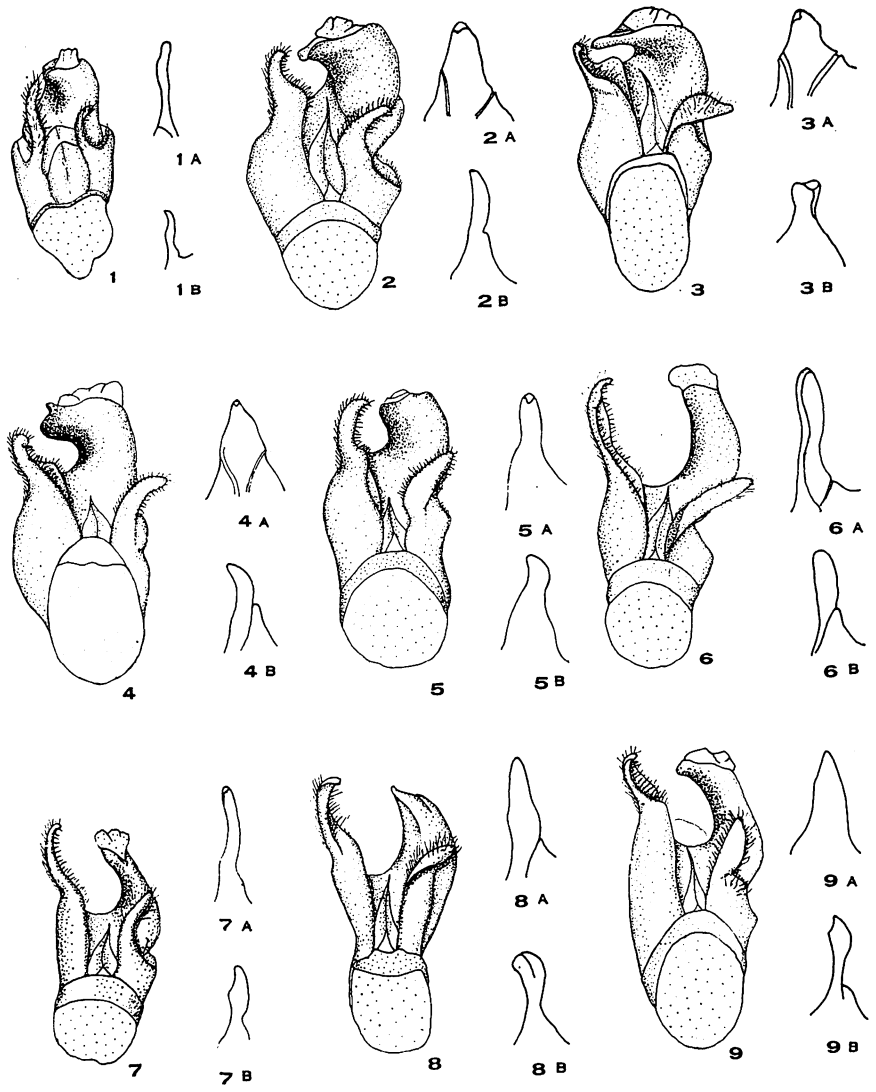

Plate I: Figures 1-9, Aedeagae of males of Chauliognathus. (A = inner face of left lateral lobe; B = lateral aspect of right lateral lobe.) 1. *Ch. marginatus* Fabricius. 2. *Ch. profundus* LeConte. 3. *Ch. lecontei* Champion. 4. *Ch. discus* LeConte. 5. *Ch. transversus* Fender. 6. *Ch. misellus* Horn. 7. *Ch. lewisi* Crotch. 8. *Ch. opacus* LeConte. 9. *Ch. pennsylvanicus* DeGeer.

1. *Chauliognathus marginatus* (Fabricius)

(Plate I, Figures 1, 1A, 1B)

Cantharis marginata Fab., 1775, Syst. Ent., p. 206.

Cantharis ligata Say, 1825, Journ. Ac. N. S. Phila., V, p. 166.

Chauliognathus marginatus, Hentz, 1830, Trans. Am. Phil. Soc., series 2, III, p. 460, Pl. XV, fig. 1; LeConte, 1851, Proc. Ac. N. S. Phila., V, p. 338. 1874, Trans. Am. Ent. Soc., V, p. 78. 1881, Trans. Am. Ent. Soc., IX, p. 44. Champion, 1914, Trans. Ent. Soc. London, pp. 153-154.

Chauliognathus hentzi LeConte, 1851, Proc. Ac. N. S. Phila., V, p. 338.

Head flavous with mouthparts, clypeus and antennae piceous to black, a rather broadly marked V-shaped postantennal fascia, base of which extends to base of neck, arms of which extend forward to or nearly to antennal sockets and laterally to inner ocular margins; pronotum orange to flavous, a broad median stripe extending from the apex to near the base; each elytron nearly always flavous with a subapical oval black spot; that often extends nearly to the base but not attaining elytral margins, very rarely elytra entirely flavous or entirely black; body beneath flavous with genae medially, mesoepisternum, metasternum, and metasternal episternum black; abdominal sternites with basal crescentic black spots medially on each side; coxae, trochanters, and usually basal half or more of femora flavous, rest of legs piceous to black, protarsi sometimes annulated. Length: male 7 to 15 (av. 8.7) mm.; female 9 to 11 (av. 9.9) mm.

Male: opaque; head as wide as pronotum, finely sparsely punctured anteriorly, finely closely punctured behind, antennae compressed beyond third segment, third segment half as long as fourth; pronotum as long as wide or nearly so, anterior margin arcuate, sides sinuate, converging slightly to obtuse hind angles; basal margin bisinuate, sides rather shallowly narrowly reflexed, basal margin deeply guttered, disc opaque margins feebly shining; elytra feeble subulate; body beneath and legs shining.

Female: similar to male; sides of pronotum arcuate, hind angles rounded; elytra nearly parallel sided, widest at middle.

Aedeagus of male: median lobe short, stout, arcuately incurved, tip produced as a short subtriangular process; left lateral lobe long, slender, sinuate, angulately produced inwardly at about middle, tip bluntly rounded; right lateral lobe half as long as left, subsecuriform with outer apical angle somewhat produced, inner angle rounded.

This species was previously recorded by Leng from New York, Florida, and Indiana and by Champion from Monterey in Nuevo Leon, Mexico. Two hundred and seventeen specimens were examined from the following localities: ARKANSAS: Hempstead Co., Washington Co.; DISTRICT OF COLUMBIA: Washington; FLORIDA: 5 m. s. of Clara, Jacksonville, Miami, Okeechobee, W. Palm Beach; GEORGIA: Rabun Co.; ILLINOIS: Broughton, DuBois, Monticello, Parker, Pekin, White Heath; KENTUCKY: "Ky."; LOUISIANA: Kinder, New Orleans, Vowell's Mill; MARYLAND: Beltsville, Montgomery Co.; MASSACHUSETTS: Dorchester, Ipswich; MISSISSIPPI: Brookhaven; NEW JERSEY: "N. Jersey," S. Orange; NEW YORK: Hight P. on Long Island, "N. Y.," "S. I." (Staten Island?), Van C. Park, Yaphank on Long Island; OKLAHOMA: Bluejacket, Centralia, Cherokee, Garvin Co., Henryetta, Hinton, Hugo, Le Flore Co., McCurtain Co., Millerton, Nashoba, Nowata, Ottawa Co., Pawnee Co., Payne Co.,

Quinton, Sallisaw, Spiro, Stillwater, Wyandotte; PENNSYLVANIA: Philadelphia, Reading, Wyomissing; TEXAS: Brazos Co., Brewster Co., Brownsville, College Station, Colorado Co., Denton Co., Dickinson, Memphis, Rock Island, Tarrant Co., Taylor, "Tex.," Weslaco; VIRGINIA: Norfolk, "Va."

2. *Chauliognathus profundus* LeConte

(Plate I, Figures 2, 2A, 2B)

Chauliognathus profundus LeConte, 1858, Proc. Acad. N. S. Phila., p. 71 (nec. Crotch, Gorham, Horn, Fender); Champion, 1914, Trans. Ent. Soc. London, p. 143-144, Pl. VI, figs. 15, 15d.

Chauliognathus ineptus Horn, 1885, Trans. Am. Ent. Soc., XII, p. 150; Fender, 1943, Pan-Pac. Ent. XIX, 2, p. 64.

Chauliognathus togatus var. Gorham, 1885, Biol. Cent.-Am., Coleopt., III, 2, p. 278.

Head black, sometimes labrum and sides of clypeus testaceous, antennae black or black with trailing edges of segments 2-11 more or less widely infuscate; pronotum reddish orange, immaculate or with two or three round to ovate black spots arranged in a transverse row across the middle, or if three spots connate, arrranged as a transverse trilobate fascia; elytra reddish orange, apical third black; body beneath reddish orange, apical sternite black; legs black with coxae, trochanters, and basal half or more of femora reddish orange. Length: male 14 to 16.5 (av. 15.31) mm.; female 16 to 17 (av. 16.44) mm.

Male: head shining and finely sparsely punctured in front of antennae, opaque and alutaceous behind, flattened behind eyes, antennae slender, third segment just visibly shorter than fourth, segments 3 to 11 flattened; pronotum transversely obovate, angles rounded, anterior margin broadly arcuate, sides rounded and widely deeply reflexed, basal margin arcuate, shallowly incurved medially, narrowly reflexed at sides, more broadly so medially, opaque, with reflexed margins feebly shining; elytra elongate, parallel sided, finely rugose punctate basally, becoming finely scabrose apically; body beneath somewhat shining.

Female: similar to male; abdomen red, fifth and six sternites each with median transverse series of two or four small black spots, seventh sternite with apical half black; apex of seventh sternite with a subquadrate median incision extending about halfway to base.

Aedeagus of male: median lobe stout, strongly bent in, with a spout-shaped apical process beneath; left lateral lobe stout, sinuate with inner margin elbowed near apical third, apical third narrowed, strongly bent, tip hooked and acute, triangular as viewed internally; right lateral lobe stout basally, rapidly narrowed and bent out at a little beyond middle, apex digitate, terete.

Forty-four specimens were examined from the following localities; all ARIZONA: Atascosa Mt.; Baboquivari Mts.; Bear Valley, s. sl(ope) Tumacacori Mts. (4,000 feet, Sycamore, Ash, Oak in valley); Browns C., e. sl(ope) Baboquivari Mts. (3,800 feet, Sycamore, Oak, Mesquite); Huachuca Mts.; San Pedro Riv. nr. Fairbanks; Santa Catalina Mts.; Tex Canyon, Chiricahua Mts., Cochise Co., 4,500-6,000 feet; Washington Mts., nr. Nogales.

LeConte (1858) described *profundus* as having the head black. In his 1881 synopsis, he cited the species as having the head red. Champion (1914) noted that LeConte's type has the head black and that the LeConte citation was incorrect.

Dr. Floyd Werner (in litt.) mentions collecting this species with *C. lecontei* on the same plants, but in no instance was any attempt at cross mating seen whereas mating within the species was frequently noted.

3. *Chauliognathus lecontei* Champion

(Plate I, Figures 3, 3A, 3B)

Chauliognathus profundus Crotch, 1874, Trans. Am. Ent. Soc., V, p. 78; LeConte, 1881, Trans. Am. Ent. Soc., IX, p. 43 (nec. Proc. Acad. N. S. Phila., 1858, pp. 278-279, Pl. VII, fig. 26); Horn, 1885, Trans. Am. Ent. Soc., XII, p. 150; Gorham, 1885, Biol. Centr.-Am., Coleopt., III, 2, p. 71; Fender, 1943, Pan-Pac. Ent., XIX, p. 64.

Chauliognathus lecontei Champion, 1914, Trans. Ent. Soc. London, p. 144, Pl. V, figs. 14, 14d.

Red; eyes, apices of mandibles, maxillary lobe, and all but apical segment of maxillary palpi, basal two or three antennal segments, apical third or fourth of elytra, tibiae, tarsi, and all but bases of femora black, pronotum with or without a longitudinal black spot medially on each lateral half, apical sternite black, antennal segments beyond the third and the apical maxillary palpal segments piceous to fuscotestaceous, pubescence cinereous, fine, inconspicuous, and decumbent on reddish areas, black, coarser, setiferous and suberect on black areas. Length: male 14 to 15.5 (av. 14.84) mm.; female 14.5 to 17.5 (av. 16.04) mm.

Male: head alutaceous to feebly shining, finely rather closely punctured, less closely so in front of antennae, widely transversely impressed behind eyes which are prominent, often with a shallow median impression extending from eyes to apex of frons, antennae slender, segments 4 to 11 flattened, with a series of rather stout spines on trailing edge of segments 1 to 9, segment 3 as long as 4 or nearly so; pronotum transversely subquadrate to transversely oboval, anterior margin arcuate, lateral margins arcuate, sides widely, deeply, angulately reflexed, bottom of lateral gutters situated at about the outer third of each lateral pronotal half, posterior angles sharply rounded, basal margin bisinuate, narrowly sharply reflexed, median discal convexity rather strongly arched, a more or less evident longitudinal median impressed line, disc opaque to feebly shining, alutaceous; scutellum short, triangular with apex truncate or truncately rounded, finely closely punctured; elytra elongate, parallel-sided, punctures separated by about their own diameters, becoming finely scabrose apically.

Female: similar to male; body beneath red, fifth and sixth sternites each with a median transverse series of two or four spots, middle spots of sixth enlarged, often fused to form an oblong spot, seventh sternite black or black with basal margin more or less widely red, apex with a deep median U-shaped incision.

Aedeagus of male: median lobe stout, strongly bent inwardly, apex produced beneath as a more or less spatulate process; left lateral lobe stout basally, sinuately narrowing to about apical fifth, apex narrow, arcuate, and hooked inwardly, triangular as viewed internally; right lateral lobe apically rotated and strongly bent out, compressed, apex subtriangular, tip sharply rounded.

One hundred and seventy-seven specimens were examined from the following

localities: ARIZONA: Arivaipa; Baboquivari Mts.; Bear Valley, Atascosa Mts.; Bear Valley, s. sl(ope), Tumacacori Mt. (4,000 feet, Sycamore, Oak, Ash in valley); Bisbee; Bloody Basin, Yavapai Co.; Brown's Cn., e. sl(ope) Baboquivari Mts. (3,800 feet, Sycamore, Oak, Mesquite); Cave Creek, Mariposa Co.; Continental; Dry Canyon, Sands Ranch, s. e. end Whetstone Mts., Cochise Co.; Empire Mts.; Ft. Apache; Globe, Gila Co. (3,600 feet, Mesquite, Oak); Graham Mt.; n. of Harshaw; Huachuca Mts.; Nogales; Oak Cr. Canyon; Oracle; 14 m. n. e. of Oracle; Oslar, Huachuca Mts.; Paradise, Chiricahua Mts.; Patagonia; Patagonia Mts.; 25 m. e. Pearce; Pepper Sauce Cn., Catalina Mts.; Sabina Cn., w. sl(ope), Santa Catalina Mts. (2,500 feet Sycamore, Oak, Mesquite); Santa Catalina Mts.; Santa Rita Mts.; Sieritta Mts.; 10 m. e. of Sonoita; Tex Canyon, Cochise Co.; Tombstone; Tubac; Tumacacori Mts. NEW MEXICO: Double-Adobe Ranch, Animas Mts., Hidalgo Co.; Glenwood, Catron Co.

4. *Chauliognathus discus* LeConte
(Plate I, Figures 4, 4A, 4B)

Chauliognathus discus LeConte, 1853, Proc. Acad. N. S. Phila., VI, p. 230; Crotch, 1874, Trans. Am. Ent. Soc., V, p. 78; LeConte, 1881, Trans. Am. Ent. Soc., IX, p. 44; Champion, 1914, Trans. Ent. Soc. London, pp. 152-153, Pl. VII, figs. 25, 25d.

Ochreous to ferrugino-testaceous, eyes and antennae black to piceous, palpi, maxillae, apices of mandibles, and clypeus fuscous to black, head with or without a black spot internal to posterior margin of each eye, pronotum immaculate or with a more or less oblique elongate macula on each side, elytra immaculate or each with a black subapical spot of variable size, legs black with bases of femora narrowly black varying to fuscous with femora, all but the apices, pale, last sternite of male and sides of last sternite of female infuscate. Length: male 10 to 12.5 (av. 11.5) mm.; female 10.5 to 13 (av. 12) mm.

Male: head shining, finely punctured, more closely so and microreticulate behind eyes and on neck, antennae slender, third segment as long as fourth or nearly so; pronotum shining, subelliptical, angles obsolete, side margins rather widely angulatedly reflexed, posterior margin narrowly reflexed toward sides and explanate medially, finely sparsely punctured, a little more closely so toward posterior margin, a feeble longitudinal median impression of variable length and depth; elytra subulate, feebly shining basally, becoming scabrous apically; abdominal sternites 2 to 7 finely transversely rugulose.

Female: similar to male, pronotum wider than long; elytra less evidently subulate.

Aedeagus of male: median lobe stout, strongly obliquely arcuate, apex nearly attaining apex of left lateral lobe; left lateral lobe stout, sinuate, rather short, apex hooked and acute; right lateral lobe shorter, more slender, digitate, strongly bent out apically.

One hundred and thirty-nine examples have been studied from the following localities: ARIZONA: "Ariz."; Nogales. ARKANSAS: Benton Co. CALIFORNIA: Medea. OKLAHOMA: Spavinaw. TEXAS: Alpine; Bexar Co.; Chisos Mts.; Comal Co.; Conean; Corpus Christi; Davis Mts.; El Paso; 100 m. e. of El Paso; 15 m. e. of El Paso; Fort Davis, Jeff Davis Co.; Marathon; Round Mt.; Sanderson; Uvalde; Uvalde Co.; Val Verde Co.

There is considerable variation in the size of the subapical elytral spots. In some localities the spotting seems to be quite consistent as to size, whereas in other localities varies from immaculate to the apical third of the elytra black (the subspecies cited below).

Chauliognathus discus subsp. *texanus* Fender new comb.

Chauliognathus texanus Fender, 1943, Pan-Pac. Ent., XIX, 2, p. 63. Similar to the species except apical third of elytra black.

Fifty-eight examples of this subspecies have been examined from the following localities, all TEXAS: Alpine; Bexar Co.; Chisos Mts.; Culberson; Davis Mts.; Ft. Davis, Jeff Davis Co.; Shafter.

This subspecies might most readily be confused with *Ch. profundus* and *Ch. lecontei,* a mistake that I made at the time of description, having compared it with them. The type series was from an apparently pure colony of the subspecies. It may readily be separated from *Ch. profundus* and *Ch. lecontei* by its smaller size, paler color, and the shape of the pronotum.

5. *Chauliognathus transversus* Fender, new species
(Plate I, Figures 5, 5A, 5B)

Head black behind middle of eyes, yellowish to brownish yellow in front with palpi, antennae and apices of mandibles black; pronotum flavous, with or without two short oblique maculae, one on each lateral half but nearer the middle; elytra flavous, each with a black spot at apical third that does not attain margins; body beneath flavous to testaceous; legs black with coxae, trochanters, and basal three fourths or more of femora flavous. Length: male 10 to 10.5 (av. 10.25) mm.; female 9.5 to 11 (av. 10) mm.

Male: head shining, finely sparsely punctured in front of antennae, more closely coarsely punctured behind and microreticulate on neck, antennal segments 3-11 somewhat compressed, third segment evidently shorter than fourth; pronotum transversely subquadrate, anterior margin arcuate, side straight to arcuate, narrowly deeply reflexed, basal margin straight, rather deeply guttered, shining, microreticulate anteriorly and near base; elytra subulate, punctures separated by from three to four times their diameters.

Female: similar to male, penultimate sternite broadly arcuately emarginate at apex, ultimate sternite narrowly deeply emarginate medially.

Aedeagus of male: median lobe stout, rather short, not produced beneath at apex; left lateral lobe unevenly sinuate, moderately stout basally, feebly bent out at apical two fifths, more slender and strongly incurved apically, tip acute; right lateral lobe curved out beyond middle, apical half obovate, tip rounded.

Holotype male, allotype female, and one paratype, Chinati Mts., Texas, collected Sept. 30, 1929 by E. R. Tinkham. Paratypes from Sanderson, Texas; Chisos Mts., Texas; Presidio, Texas.

Described from four males and seven females, this species appears to be comparatively rare in collections. It most closely resembles *Ch. discus* and *Ch. misellus* from which it may be readily distinguished by the shape of the pronotum, subelliptical in these species and subquadrate in *Ch. transversus.* The comparative lengths of antennal segments 3 and 4 vary to the extent that they negate the importance of this characteristic as employed by LeConte (1881).

6. *Chauliognathus misellus* Horn
(Plate I, Figures 6, 6A, 6B)

Chauliognathus misellus Horn, 1885, Trans. Am. Ent. Soc., XII, p. 150.

Chauliognathus discus Champion, 1914, Trans. Ent. Soc. London, p. 152, Pl. VII, figs. 25, 25a.

Head black, area in front of eyes, around antennal sockets and mandibles testaceous; pronotum reddish yellow, immaculate or rarely with a small reddish brown spot on each side near the middle; elytra flavous, each with a small round to transversely oval black spot at the apical third, not attaining margins; head beneath black with mentum testaceous, body beneath yellowish, metasternum black posteriorly, this black area subtriangular extending anteriorly medially to about the middle of metathorax; abdominal sternites of female with basal half black, these black areas more or less widely interrupted medially, last sternite piceous, legs piceous, anterior tibiae paler, all coxae testaceous apically. Length: male 9.5 to 11 (av. 10.4) mm.; female 11 to 13 (av. 12.25) mm.

Male: head shining, finely sparsely punctured in front of antennae, opaque and more coarsely closely punctured behind, transversely concave behind eyes, antennae not apically compressed, segment 3 about two thirds as long as segment 4; pronotum transversely subelliptical, anterior angles obliterated, hind angles obtusely rounded, sides and base rather shallowly reflexed, base narrowly and sides more widely so, disc feebly shining, microreticulate; elytra widest near middle, lateral margins feebly arcuate, feebly shining, punctures separated by from five to ten times their diameters.

Female: similar to male, abdomen more heavily marked with black.

Aedeagus of male: median lobe stout, moderately arcuate, apex rounded and not produced; left lateral lobe long, slender, concave internally, becoming sinuate medially, apical half moderately arcuate with the tip feebly hooked, basal half dilated; right lateral lobe short, digitate, basally compressed, obliquely bent out from about the middle.

Thirty-six specimens were examined from the following localities: ARIZONA: Atacosa Mt.; Box Canyon, Santa Rita Mts.; Chiricahua Mts.; Huachuca Mts., Cochise Co.; Madera Canyon, Santa Rita Mts.; San Pedro R., Fairbanks; Santa Rita Mts.; Sierra Ancha Mts.; Tanque Verde Mt.; Tucson. TEXAS: "Tex." (in the Van Dyke collection).

In all but two specimens, the pronotum is immaculate. A female from Tucson has the pronotum with a black spot medially on each side, much as in the maculate *Ch. discus*. A male from Tucson has a shallow M-shaped transverse pronotal fascia.

7. *Chauliognathus lewisi* Crotch
(Plate I, Figures 7, 7A, 7B)

Chauliognathus lewisii Crotch, 1874, Trans. Amer. Ent. Soc., 5:78.

Chauliognathus scutellaris Champion, 1914, Trans. Ent. Soc. London, pp. 151-152.

Head black with sides in front of eyes and mandibles flavotestaceous, antennae and palpi nigropiceous; pronotum flavous with a large M-shaped or urn-shaped black discal spot; scutellum black, elytra flavous, bases with a short transverse black spot that usually attain the scutellum, forming a transverse basal fascia not extending to lateral margins; apical two thirds to three fourths of elytra black with margins pale, apices of these markings rounded, bases truncate; body beneath flavous, outer portion of metasternal epimeron black, posterior margin of metasternum black, this black area widest medially, narrowed toward sides; legs piceous, apices of coxae and bases of trochanters flavous, protibiae paler beneath. Length: male 8 to 10 (av. 8.5) mm.; female 8.5 to 10 (av. 9.52) mm.

Male: head shining, finely sparsely punctured in front of eyes, more coarsely so behind, as wide as pronotum, antennal third segment evidently shorter than fourth, segments 7 to 10 stouter and feebly compressed; pronotum subelliptical, smooth, shining, and very finely punctured, anterior margin explanate, sides explanate in anterior half, narrowly shallowly reflexed in basal half, posterior angles rather sharply rounded, posterior margin feebly arcuately concave medially, shallowly guttered toward sides; elytra feebly subulate, widest at basal fourth, somewhat shining basally, becoming finely scabrose apically.

Female: similar to male, pronotum more transverse, evidently wider than head, abdominal sternites or at least apical ones with bases more or less widely blackish each side of middle.

Aedeagus of male: median lobe strongly obliquely bent, apex produced somewhat and subtriangularly rounded; left lateral lobe long and slender, basal half stouter and straight, rather abruptly narrowed and inner margin sharply rounded at the middle, apical half arcuate and slender, tip acute; right lateral lobe shorter, broad basally, apical half oblique and digitate.

One hundred and twelve specimens examined: ARIZONA: "Ariz."; Blood Basin, Yavapai Co.; Chiricahua Mts. (5,000-6,000 feet); Gila Bend; Grand Canyon; Oracle; Pepper Sauce Cn., Santa Catalina Mts.; Prescott; Sierra Ancha Mts.; Tex Canyon, Chiricahua Mts. (6,000 feet); Yavapai. CALIFORNIA: Ivanpah, San Bernardino Co.; MEXICO: 20 m. n.w. of Nuevo, Casa Grande, Chihuahua; NEW MEXICO: Carlsbad. TEXAS: Alpine; Chinati Mts.; Davis Mts.; Guadelupe Pass, Guadelupe Mts., Culbertson Co.; Sanderson; Shafter, Presidio Co. (4,000 feet, Larrea, Prosopis in Creek Bottom).

A female of this species, possibly through some accident in one of the immature stages, has the pronotum imperfectly formed. The pronotum is broken down the middle into two transversely arranged circular discs, each flavous with the center widely black, the margins unevenly shallowly reflexed. These discs do not touch but are connected beneath by a yellow sclerotized band.

Chauliognathus lewisi subsp. *vittatus* Schaeffer, new comb.

Chauliognathus vittatus Schaeffer, 1909, Bull. Brook. Inst., I, p. 380.

Chauliognathus vittatus Champion, 1914, Trans. Ent. Soc. London, p. 152.

Similar to the species but with the basal and apical elytral markings connected to form vittae.

Eighty-nine specimens examined: ARIZONA: Atascosa Mts.; Baboquivari Mts.; Bear Valley, s. sl(ope) Tumacacori Mts.; (4,000 feet, Sycamore, Oak, Ash in valley); Brown's Cn., e. sl(ope) Baboquivari Mts. (3,800 feet, Sycamore, Oak, Mesquite); Florida Rg. St.; Graham Mt.; Horslow; Huachuca Mts.; Lochiel, Santa Cruz Co. (grassy wash in grassland); Nogales; 8 m. w. of Nogales (8,000 feet, Chaparal zone); Patagonia Mts.; Pepper Sauce Cn., Santa Catalina Mts.; rd. to Petersen's Ranch, Huachuca Mts.; San Pedro Riv., Fairbanks; Santa Catalina Mts.; Santa Rita Mts.; Sycamore Canyon, Atascosa Mts.; Tex Canyon, Chiricahua Mts.; Tumacacori Mts.

The subspecies *vittatus* is apparently quite restricted in range, being confined to the south-central portion of Arizona. In our material the range is from Baboquivari Mts. in the west to the Patagonia Mts. in the east and from the Mexican border in the south to the Santa Catalina Mts. in the north. In the latter area, the only locality where a mixed population has been examined, a series of 16 specimens vary almost evenly from *Ch. lewisi lewisi* to *Ch. lewisi vittatus*. *Ch. lewisi lewisi* is much more widely distributed ranging from southern California to Texas. In Arizona its distribution is more northerly, extending north to Grand Canyon and south to the Chiricahua Mts. in the southeast corner of the state.

8. *Chauliognathus opacus* LeConte

(Plate I, Figures 8, 8A, 8B)

Chauliognathus opacus LeConte, 1965, Smith. Misc. Coll., VI, #167, 2d. ed., p. 90.
Chauliognathus limbicollis Champion, 1914, Trans. Ent. Soc. London, p. 149 (in part).

Head black, mandibles testaceous to yellow with apices darker; pronotum black with margins yellow; scutellum black; elytra yellow, each with an apical black spot that does not attain sides or apex, this spot broad to near middle then diagonally narrowed toward suture where it may become abbreviated or may continue subsuturally to base; head beneath black with mentum and often lobes of mentum flavous; thorax beneath black or black with margins of sutures more or less narrowly yellow; legs black with trochanters, apices of coxae and bases of femora reddish yellow, protibiae paler beneath; abdomen yellow, aedeagal cap of male a little darker; pubescence dual on elytra, primary pubescence aureous, somewhat stouter, sparse, separated by about their individual lengths, secondary pubescence cinereous, subdecumbent, finer, and separated by less than their individual lengths. Length: male 9.25 to 11 (av. 10.25) mm.; female 10 to 12.5 (av. 10.85) mm.

Male: head finely scabrose, more closely so behind antennae, third antennal segment about half as long as fourth; pronotum transversely subquadrate, sides arcuate to about middle, nearly straight and converging slightly to base, narrowly deeply reflexed, base oblique from sides to near middle which is feebly incised, rather strongly guttered, marginal bead fine, opaque with reflexed margins shining; elytra feebly subulate, feebly shining and moderately coarsely punctured basally, becoming opaque and finely rugose punctate apically.

Female: similar to male; third antennal segment a little more than half length of fourth; bases of femora less widely pale; abdominal sternites yellowish with last sternite black at sides varying to each sternite with a transverse basal mark on each side and last sternite with median portion narrowly pale.

Aedeagus of male: median lobe obliquely curved in, moderately thick, apex produced beneath as a subspatulate process; left lateral lobe long, slender, inner margin evenly sinuate, outer unevenly sinuate to acutely hooked apex; right lateral lobe digitate, evenly arcuately bent out, apex angulate.

One hundred and nine specimens examined from: ARIZONA: Cochise Co.; Copper Basin nr. Prescott; Mingus Mts.; road to Petersen's Ranch, Huachuca Mts.; Rustler Pk., Chiricahua Mts.; Sierra Ancha Mts.; Tex Canyon, Chiricahua Mts.; Verde River, nr. Del Rio, Yavapai Co.; Washington Mts., nr. Gonzales; White Mts. TEXAS: Alpine; Davis Mts.

The range of this species seems to be rather east-west in length, from the west-central part of Arizona to the Alpine area of western Texas, with a lateral range of from Prescott, Arizona, to the north to Alpine, Texas, in the south.

The Texas representatives average nearly a millimeter longer than the average for the Arizona specimens.

9. *Chauliognathus pennsylvanicus* (DeGeer)

(Plate I, Figures 9, 9A, 9B)

Telephorus pennsylvanicus DeGeer, 1773, Memoires Pour Serviv a l'histoire des insectes. Stockholm, IV, p. 78.
Cantharis americanus Forster, 1771, A Catalogue of the animals of North America, London, p. 50.
Cantharis 2-maculata Fabricius, 1871, Species Insectorum, 1:259.
Chauliognathus bimaculatus, Hentz, 1830, Trans. Am. Phil. Soc., ser. 2, III, p. 461, Pl. XV, fig. 2.
Telephorus bimaculatus, LaPorte, 1835-40, Histoire naturelle et iconographie des Coleopteres, Paris, I, p. 275.
Chauliognathus pennsylvanicus LeConte, 1851, Proc. Acad. N. S. Phila., V, p. 388; 1881, Trans. Amer. Ent. Soc., IX, p. 44.

Head black, first two or three antennal segments pale beneath; pronotum flavous with a broad transverse discoidal spot; elytra flavous to flavotestaceous, each with a black spot that may be small and subapical or elongate and extending nearly to base, margins entirely pale; thorax black beneath, sutures more or less widely testaceous, abdomen testaceous, each sternite with a transverse fuscous spot medially on each side, varying to body black beneath with some thoracic sutures narrowly pale, abdominal sternites black with apical margins widely pale; legs black with anterior tibiae piceous to brunneous. Length: male 9 to 12 (av. 10.5) mm.; female 9 to 11 (av. 10.55) mm.

Male: head shining and finely sparsely punctured in front of antennae, becoming opaque and more closely punctured behind, flattened behind antennae, third antennal segment evidently shorter than fourth, segments 3 through 11 feebly flattened; pronotum transversely subquadrate, anterior and basal margins broadly rounded, sides straight to feebly curved, broadly rather deeply reflexed, basal margin thickly beaded, margining a rather deep basal gutter, extending laterally to and uniting with the deep lateral depressions, reflexed margins shining and rather coarsely sparsely punctured; discal area opaque; elytra subparallel sided, widest at about middle, shining and coarsely sparsely punctured basally, becoming opaque and finely rugose apically; body beneath finely closely punctured, sternites 1 through 7 finely transversely strigulose.

Female: similar to male, seventh sternite normal, eighth sternite semicircular with an apical median notch the tip of the notch truncated.

Aedeagus of male: median lobe obliquely curved in, apex produced beneath as a short spoon-shaped process; left lateral lobe stout, long, angularly dilated medially, apical half arcuate to the apex; right lateral lobe about half length of left, digitate, feebly obliquely bent from near base.

This is one of our most abundant and widespread species ranging from Colorado east and from Florida and Texas north through Maine and Minnesota and on into Ontario.

Two hundred and eighty-four specimens have been examined from: ARKANSAS: McGehee, Washington Co. ALABAMA: Fort Payne. COLORADO: Boulder. FLORIDA: Daytona; Enterprise. ILLINOIS: Beech; Borton; Charleston; Dubois; Hillsboro; Marion; Oakwood, Urbana. IOWA: Mt. Pleasant. KENTUCKY: Hardin Co. LOUISIANA: Kinder; Vernon Pl. MAINE: Enfield. MASSACHUSETTS: Amherst. MICHIGAN: Bay City; East Lansing. MINNESOTA: Wabasha Co. MISSISSIPPI: Brookhaven. NEBRASKA: Ashland; Atkinson; Cedar Bluffs; Childs Point; David City; Fairmont; Halsey; Lincoln; Nebraska City; North Platte; Omaha; S. Sioux City; Stuart. NEW JERSEY: Lakehurst. NEW YORK: Alps; Brant Lake; Buffalo; Lancaster; Long Island; Taconic Park. OHIO: Amherst. PENNSYLVANIA: Philadelphia; Wyomissing. SOUTH CAROLINA: Clemson College. TEXAS: College Station. VIRGINIA: Warm Springs. CANADA, ONTARIO: Rockport.

Two major varieties of this species are found with occasional intermediates to be found. The most common and widespread variety has the elytral spots confined to the apical half or less of the elytra, both ends of the obovate spot sharply rounded. The other variety has the elytral spots extending nearly to the elytral bases, these striae narrowing at the middle, the basal half narrower than the apical and truncate at the base.

(*To be continued*)

Major Bathymetric Features near the Coast of Oregon, Washington, and Vancouver Island[1]

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SINCE JANUARY 1961, studies have been carried out by the Department of Oceanography, University of Washington, concerning the Columbia River's effect on the oceanographic regimen of the Northeast Pacific Ocean. These investigations have included the physical properties of the water (Budinger and others, 1963), the chemical properties of the water (Stefansson and Richards, 1963), the biology of the area (Anderson, 1963), and the sediment and radioactivity distribution (Gross and others, 1963). Only preliminary results have been published, but at the present stage of the geological study it is apparent that the names of the bathymetric features in the area should be reviewed.

Most of the major bathymetric features off the coast of the northwestern United States and southwestern Canada have been named since the late 1930's, but at no time has an attempt been made to formalize the terminology. The initial appearance of several names in reports of limited distribution increased the problems. The publication of several recent review papers by writers not currently participating in studies of the bottom topography of the Northeast Pacific Ocean has promulgated some inappropriate and erroneous names. Because of this enlargement of the problem, and as a result of geologic studies currently under way off the Washington-Oregon coast, the need for the formalization of the names of the major bathymetric features has now been realized.

All names used in this paper have been approved by the United States Board on Geographic Names and are the accepted names for these features. Cooperation was also received from the Canadian Permanent Committee on Geographical Names in regard to the names of the features off the coast of Vancouver Island. The 38 names include: (a) 19 names that have previously appeared in print, although some of these were used only in technical reports; (b) 3 names that are corrections of previous names; and (c) 16 new names. Of the 38 bathymetric features, 15 are submarine canyons.

[1] Contribution No. 299 of the Department of Oceanography, University of Washington.