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CONTENTS

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Julius George Grundell
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The Pan-Pacific Entomologist

VOL. X, No. 1 January, 1934

THE HISTORICAL BACKGROUND OF ENTOMOLOGY IN RELATION TO THE EARLY DEVELOPMENT OF AGRICULTURE IN CALIFORNIA

BY E. O. ESSIG

INTRODUCTION

One of the most interesting aspects in the study of the development of entomology in California has been the correlation of historical facts forming the background of this comparatively new science. This state affords an unusual opportunity to study such development because of the great variations in the physical features of the country, which include elevations from below sea level to the crest of the Sierras, exceeding 14,000 feet altitude, and the arid deserts of the southwest to the humid north coastal regions. These physical features had much to do in isolating the fauna and flora so that many of the common destructive insects, native of the Great Plains and Great Basin areas, did not reach the Pacific Coast. Climatic conditions have also been of exceedingly great importance in this development. Embodying practically every conceivable condition from the semi-tropical, in southern California, to the frigid, in the high mountains, the average climate is mild as has been clearly demonstrated by the development of a most unusual and varied agriculture in what was, before the advent of the white man, practically a desert insofar as food-producing crops were concerned. Acorns, pine nuts and other seeds, berries, bulbs, and roots of native plants afforded the vegetable diet of the aboriginies. The only pretense at primitive agriculture was practiced by a few Indians along the flooded lowlands of the lower Colorado River, where maize, beans, and melons were produced in very small quantities.

It is true that there were many native species of insects in this state. Few areas in the entire country have produced a larger or more varied entomological fauna and few places have been so attractive to the entomological explorers and collectors, with the result that a very great many, if not most, of the insect species have been taken and described. How many there are can only be

conjectured. The difficulty of ascertaining the number is due to the cosmopolitan nature of the entomological workers, who have collected and described insects, and the many periodicals and languages by means of which their efforts have been made known to the world.

In 1913 Professor C. W. Woodworth[1] listed 9,622 species of insects as occurring in the state. Judging from such additions as I have been able to make, his list includes about one-third of all the known described forms to date.

By far the greater number of important insect pests occurring in California today and of consequence in relation to human welfare, domestic animals, and agricultural products, are of foreign origin. In a cursory check of these I counted at least 225 species which are certainly of economic importance. No doubt there are many more. It is not the purpose of this paper to either list or discuss these in detail. Some of them have been treated in A History of Entomology,[2] to which the reader is also referred.

While the wide range of climate has permitted the establishment of many kinds of pests within the state, the mass production of individual crops, like citrus, peaches, apples, pears, grapes, cotton, melons, etc., has been responsible for the favorable development of the different pests on these various crops and has usually made conditions more ideal for the pest in the new land than was possible under natural conditions in its native environment.

The Spanish or Mission Period—1769-1877.

The Spanish settlements in Alta California began with the establishment of the Mission San Diego in 1769 and their influence continued along the coast as far north as Sonoma until the beginning of Secularization in 1834 and was terminated by the Bear Flag Affair in 1846. The development of agriculture for the maintenance of the missions and to provide for the Indians was one of the chief aims of the Fathers.

"In establishing a Mission, the Fathers took along, among other things, all utensils necessary for cultivating the soil; also fruit, vegetable and flower seeds, trees, roots and vines for the orchard and garden, besides a good supply of wheat and corn wherewith to seed the fields. Horses, horned stock, sheep, hogs

[1] Guide to California Insects (Berkeley, 1913), 360 pp.
[2] Essig, E. O., A history of entomology (N. Y., Macmillan Co., 1931).

and poultry also formed an essential part of their outfits. The first lessons of industry taught the natives (aside from the construction of the Missions) were those connected with agriculture. Thus the early missionaries here were the first farmers in California—their farming, moreover, was on quite an extensive scale."[1]

Palou[2] has given an accurate account of the development and size of the livestock industry at the California Missions during the period from 1773 to 1787, and casual references to the production of agricultural crops, chiefly wheat, beans, and corn.

More complete reports, however, have been preserved by foreign visitors some of which are briefly stated in the ensuing paragraphs.

Among the early navigators who visited Alta California and referred to the agriculture of the Spanish settlers, the Frenchman La Pérouse, [3] made the following observations in September, 1786: "The soil is inexpressibly fertile. Every kind of garden plant thrives astonishingly. We enriched the gardens of the governor and the Missions with different grains which we had brought from Paris, which were in perfect preservation, and will add to the sum of their domestic enjoyments.

"The crops of maize, barley, wheat and pease, can only be compared to those of Chili. Our European cultivators can form no conception of so abundant a fertility. The medium produce of wheat is seventy or eighty for one, and the extremes sixty and a hundred. Fruit-trees are still very scarce, but the climate is extremely proper for their cultivation, and differs little from the southern provinces of France; at least the cold is never more intense, while the heats of summer are much more moderate, on

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[1] Ewer, W. B., History of California Agriculture, Pacific Rural Press, vol. 10, p. 312 (Nov. 13, 1875).

Simpson, Sir George, An overland journey round the world during the years 1841 and 1842 (American Edition, Philadelphia. Lea and Blanchard, 1847), pp. 153-223. Sir George Simpson was governor-in-chief of the Hudson Bay Company's Territories.

La Pérouse, J. F. G. de, A voyage round the world, performed in the years 1785-1788. (English translation, Robinson, London, 1799), vol. I, 539 pp., portrait of La Pérouse; vol. II, 531 pp.

Vancouver, George, A voyage of discovery to the North Pacific Ocean and round the world in 1790-1795 (London, Robinson and Edwards, 1798), vol. I, 432 pp., 7 pls.; vol. II, 504 pp., 5 pls.; vol. III, 505 pp., 6 pls.

Lelong, B. M., Horticultural history of California, Calif. State Board of Hort., Annual Rept., 1892, pp. 33-43 (1893).

[2] Bolton, H. E., Historical Memoirs of New California by Fray Francisco Palóu (Berkeley, U. C. Press, 1926), vol. I, 331 pp., 6 pls.; vol. II, 390 pp., 10 pls.; vol. III, 399 pp., 5 pls.; vol. IV, 446 pp., 10 pls.

[3] Op. cit. vol. I, pp. 441, 442; vol. II, p. 404.

account of the continual fogs which prevail in these countries, and communicate a degree of humidity very favourable to vegetation."

Thus it will be seen that foreign seeds were obtained in this instance, direct from France and is illustrative of the many sources from which agricultural products were, from the very beginning, introduced into the virgin shores of this new land.

In 1792, Vancouver[4] visited several of the Spanish settlements along the coast of California and made some observations concerning agriculture as practiced by the settlers of that time. The following excerpts are from his published report:

"Instead of finding a country tolerably well inhabited and far advanced in cultivation, if we except its natural pastures, the flocks of sheep, and herds of cattle, there is not an object to indicate the most remote connection with any European, or other civilized nation."

At the Presidio, San Francisco, "Two small spaces in the plain, very insecurely inclosed, were appropriated to kitchen gardens; much labor did not appear to have been bestowed either in the improvement of the soil, in selecting the quality of the vegetables, or in augmenting their produce; the several seeds once planted in the ground, nature was left to do the rest without receiving any assistance from manual labor."

Concerning the Mission gardens at San Francisco the following comment was made: "Even their garden, an object of such material importance, had not yet acquired any great degree of cultivation, though its soil was a rich black mould, and promised an ample return for any labor that might be bestowed upon it. The whole contained about four acres, was tolerably well fenced in, and produced some fig, peach, apple, and other fruit trees, but afforded a very scanty supply of useful vegetables; the principal part lying waste and over-run with weeds."

At the Mission Santa Clara, Vancouver found agriculture better developed, due, no doubt, to more favorable soil and climatic conditions. Concerning it he states:

"They cultivate wheat, maize, peas and beans; the latter are produced in great variety, and the whole in greater abundance than their necessities require. Of these several sorts they had many thousand bushels in store, of very excellent quality, which

[4] Op. cit., vol. 2, pp. 8, 9, 14, 19, 20, 36, 494 (1798).

had been obtained with little labour, and without manure. By the help of a very mean, and ill contrived plough drawn by oxen, the earth is once slightly turned over, and smoothed down by a harrow; in the month of November or December, the wheat is sown in drills, or broad cast on the even surface, and scratched in with the harrow; this is the whole of their system of husbandry, which uniformly produces them in July or August an abundant harvest. The maize, peas, and beans, are produced with as little labour; these are sown in the spring months, and succeed extremely well, as do hemp and flax, or linseed. The wheat affords in general from twenty-five to thirty for one according to the seasons, twenty-five for one being the least return they have ever yet deposited in their granaries from the field; notwithstanding the enormous waste occasioned by their rude method of threshing, which is always performed in the open air by the treading of cattle. The product of the other grains and pulse bears a similar proportion to that of the wheat. I was much surprised to find that neither barley nor oat were cultivated; on inquiry I was given to understand, that as the superior kinds of grain could be plentifully obtained with the same labour that the inferior ones would require, they had some time ago declined the cultivation of them. The labours of the field are performed under the immediate inspection of the Fathers, by the natives who are instructed in the Roman Catholic faith, and taught the art of husbandry. The annual produce is taken under the care of these worthy pastors, who distribute it in such quantities to the several persons as completely answers all the useful and necessary purposes.

"Besides a few acres of arable land, which we saw under cultivation near the Mission, was a small spot of garden ground, producing several sorts of vegetables in great perfection and abundance. The extent of it, however, like the garden at St. Francisco, appeared unequal to the consumption of the European residents; the priests, and their guard, consisting of a corporal and six soldiers. Here were planted peaches, apricots, apples, pears, figs, and vines, all of which, excepting the latter, promise to succeed very well. The failure of the vines here, as well as at St. Francisco, is ascribed to a want of knowledge in their culture; the soil and climate being well adapted to most sorts of fruit. Of this we had many evidences in the excellence of its natural unassisted productions."

In the Carmel Valley near the Mission Carmel "a few acres of land exhibited a tolerably good plant of wheat."

In referring to the Mission San Buena Ventura this interesting account is given:

"The average produce of their seed does not yield more than twenty-three for one in wheat, barley, and oats; the quality of which is not by any means equal to the same sort of corn grown in the more northern settlements. This inferiority is attributed more to the want of rain than to the comparative difference of the soil; since, although the soil and climate of the latter appeared to be more suitable to the agriculture of the open fields, yet the garden of Buena Ventura far exceeded anything of that description I had before met with in these regions, both in respect of the quality, quantity, and variety of its excellent productions, not only indigenous to the country, but appertaining to the temperate as well as torrid zone; not one species having yet been sown, or planted, that had not flourished, and yielded its fruit in abundance, and of excellent quality. These have principally consisted of apples, pears, plums, figs, oranges, grapes, peaches, pomgranates, together with the plantain, banana, cocoa nut, sugar cane, indigo, and a great variety of the necessary and useful kitchen herbs, plants and roots. All these were flourishing in the greatest health and perfection, though separated from the sea-side only by two or three fields of corn, that were cultivated within a few yards of the surf. The grounds, however, on which they were produced, were supplied, at the expense of some labour, with a few small streams, which, as occasion required, were conducted to the crops that stood most in need of water. Here also grew great quantities of the Indian fig, or prickly pear; but whether cultivated for its fruit only, or for the cochineal, I was not able to make myself thoroughly acquainted."[5]

Wheat, maize, and barley were produced in large quantities while smaller amounts of beans (frijoles), garbanzos, and peas also were grown.

According to Forbes,[6] in 1834 in all Spanish California there were but three crude flour mills which turned out a very inferior product. Oats were unknown. The potato, although it thrived well,

[5] Cochineal was propagated on opuntia cactus at some of the Missions in Baja California, but I have seen no record of its cultivation at the Spanish Missions in Alta California.

[6] Forbes, Alexander, History of Upper and Lower California (London, 1839), pp. 259-261.

was but little grown. Vegetables were almost unknown. Raisins and wine were produced in considerable quantities, as were also olives and olive oil.

The land was stirred by a crude plow which was for many years known as the California plow. It consisted of several heavy sticks, the one serving as a share was shod with a small piece of iron. In describing its use Beechey[7] relates the following incident at the Mission San Jose in November, 1826: "Their plough appears to have descended from the patriarchal ages. It will scarcely be credited as agriculture in other countries, that there were seventy plows and two hundred oxen at work upon a piece of light ground of ten acres."

Pasturage was the great industry; there were in California in 1834, according to Forbes, 216,727 black cattle, 32,201 horses, 2,844 mules, 177 asses, 153,455 sheep, 1,873 goats, and 834 swine, making a total of 408,116 domestic animals in addition to great numbers which were running wild. Poultry was also raised in considerable quantities. The small amount of exceedingly poor butter was made with the hands without a churn and the cheese "was of the worst description." At this time a fat ox could be bought for five dollars, a saddle horse for ten dollars, a mare for five dollars, a mule for ten dollars, and a sheep for two dollars. Eggs sold in San Francisco in 1822 for two dollars a hundred.[8] Hides, tallow, wool, wheat and a small quantity of wine were exported. In 1831 the value of all agricultural products in California was $86,286.[9]

The hide ships began operating in 1824.[10] Whalers secured their supplies chiefly at San Francisco and Monterey, whereas the hide ships traded freely along the coast from Monterey to San Diego. The hide and tallow trade did not thrive until Mexico became independent. In 1841 and again in 1845 there were as many as fifty vessels on the coast, and the revenue during the last year amounted to $140,000. More than half of the ships were from New England.[11] A splendid idea of the hide and tallow trade as well as of the life

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[7] Beechey, Capt. F. W., Narrative of a voyage to the Pacific and Beering's Strait in the years 1825-1828, new ed., vol. 2, p. 38 (1831).

[8] Forbes, Alexander, Op. cit., pp. 265-270, 328.

[9] Pacific Rural Press, vol. 16, p. 41 (July 20, 1878).

[10] Spanish or so-called Manila galleons from the Philippines began touching at the port of Monterey from 1779 onward and may have been responsible for the importation of plants and insects into California direct from the Orient.

[11] Cleland, R. G., A History of California—American Period (N. Y., Macmillan Co., 1922), pp. 41-43.

in California in those days may be obtained from the interesting records of Dana[12] and Robinson,[13] both of whom gave splendid accounts of the hide and tallow trade at its height.

The Mission period ended with the secularization of the Missions which took place gradually from 1834 to 1837, when the livestock and loose property were sold to the highest bidder.

The first orange trees grown at the Mission San Gabriel were by Padre Thomas Sanchez about 1804. These were propagated from seeds obtained from the Mission San Rafæl in Lower California. This orchard served as a nucleus for many which followed. A second planting from it was soon afterwards made by Don Luis Vignes at Azusa. Later J. W. Wolfskill, in 1841, set out an orange grove of two acres, later increased to seventy acres, on his ranch in Los Angeles. The latter was the first commercial orchard and was productive in 1874.

It was not until 1873 that Mrs. Eliza Tibbets brought to Riverside the two famous naval orange trees received from the U. S. Department of Agriculture, which had imported them from Bahia, Brazil. The famous seedling orange tree at Bidwell's Bar was planted in 1859.

Although the olive, fig, grape, deciduous fruits, citrus trees, and ornamentals were extensively planted about the Missions throughout California, it is interesting to note that not a single agricultural insect pest of any importance is known to have been introduced along with the cuttings, scions, and trees which were brought from Spain, Hawaii, South America, and probably also from Europe and the Orient during this early period.

According to Dr. E. C. Van Dyke, the first insect described from the Pacific Coast was a beetle, *Carabus tædatus* Fabr., taken by one of the members of Captain James Cook's third voyage, about 1778, presumably at Unalaska, Alaska. It was later presented to Sir Joseph Banks, who deposited it in the British Museum,

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[12] Dana, Richard Henry, Jr., Two years before the mast, a personal narrative of life at sea (N. Y., Harper and Bros. 1840) (Many editions, the later ones with additional notes). Dana sailed from Boston in the brig *Pilgrim* in August 1834. He reached Santa Barbara, California, in January, 1835, sailed as far north as Monterey; left San Diego in May, 1836, and arrived in Boston, September 16, 1836. The "agent" or "our agent" referred to in this book is no other than Alfred Robinson.

[13] Robinson, Alfred, Life in California (New York, 1846) (Several later editions). Robinson came to California in 1829 to act as agent for Bryant, Sturgis & Co., Boston trading merchants, who were owners of the brigs *Pilgrim* and *Alert* referred to by Dana. He returned to Boston in 1837 to 1840 and was there again from 1842 to 1849. After this he lived in California until his death in 1895. His long residence and extensive travels in the state make his records of great importance.

where it was later noted by Johann Christian Fabricius when he visited England in 1801. Fabricius described it in 1806.

The granary weevil, *Sitophilus granarius* (Linn.), and the rice weevil, *S. oryzæ* (Linn.), both appear to have been introduced with the seed wheat, barley and corn at all the Missions.[14] Forbes[15] remarks that "maize in warm countries is liable to spoil and to be infested by an insect called in Spanish *gorgojo* (weevil); and as it is found that maize keeps longer in the husk, it is sometimes left so till it is required for use; but although it may be kept somewhat longer in this state than when separated, yet it is also soon subject to the attack of this insect."

The bean weevil, *Mylabris obtectus* (Say), was so common throughout the country that it must also have been brought in at an early date and also probably occurred in the many varieties of beans grown by the Indians of the Southwest.[16]

Lice and fleas were abundant among the Indians and common among the Spanish. California early got a bad reputation for fleas—a reputation largely established by early voyagers who visited the coast during this period. Capt. Frederick William Beechey,[17] who visited San Francisco Bay and the neighboring settlements in 1826, sent three of his men overland to Monterey, November 9, 1826, to purchase supplies, and relates this incident: "They arrived at a farm house about half way between San Francisco and Santa Clara, called La Pulgas[18] (the fleas); a name which afforded much mirth to our travelers, in which they were heartily joined by the inmates of the dwelling, who were well aware that the name had not been bestowed without cause (op. cit. p. 44). Here, had there been accomodation, and had the place not acquired the reputation its name conveys, they would willingly have ended their day's journey; but the idea of *las pulgas*, sufficiently numerous in all the houses of California, determined them to proceed as soon as they conveniently could."

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[14] Essig, E. O., Some insects from the adobe walls of the Old Missions of Lower California. Pan-Pacific Ent., vol. 3, p. 194 (1927).

[15] Forbes, Alexander, Op. cit., p. 255.

[16] Adult specimens of the bean weevil have been taken with lima beans from the Inca graves at Ancon, Peru, which antedate the arrival of the Spanish there. Essig, E. O., Origin of the bean weevil, Jour. Econ. Ent., vol. 22, pp. 858-861 (1929).

[17] Beechey's Voyage to the Pacific and Beering's Strait in the Years 1825-1828. New ed. 2 vols., vol. 2, pp. 44-45 (1831). (In the ship *Blossom*).

[18] In 1831 Alfred Robinson visited "El Rancho de las Pulgas which was the property of Donna Soledad Ortega, widow of Don Luis Arguello, former Mexican Governor of California" (1823-1825) (Op. cit., p. 58) and was delightfully entertained by the charming lady. He made no mention of fleas, so that the place was probably ordinary in this respect.

The Spanish ships which transported supplies and livestock to the Mission settlements along the coast and subsequent whalers and traders, undoubtedly carried the house fly, *Musca domestica* (Linn.); the stable fly, *Stomoxys calcitrans* (Linn.); the bluebottle flies, *Calliphora erythrocephala* (Meigen) and *C. vomitoria* (Linn.); the greenbottle flies, *Lucilia sericata* (Meigen) and *L. cæsar* (Linn.); the black blowfly, *Phormia regina* (Meigen); and the tropical blowfly, *Paralucilia fulvipes* Macquart (*Chrysomyia wheeleri* Hough). All of these found conditions favorable for rapid increase and soon became pestiferous. The only reference I was able to find as to their abundance is in Beechey's[21] account of a trip to the Mission San José in November 1826, in which he states that the Padres "had been so long excluded from the civilized world that their ideas and their politics, like the maps pinned against the walls, bore date of 1772, as near as I could read it for fly spots."

According to Dr. E. C. Van Dyke, these ships also carried the carabid beetle, *Pristonychus complanatus* Dejean, as far north as San Francisco Bay. Cockroaches, bedbugs, and itch and scab mites were also brought in by the earlier settlers. The later whaling, fur, and hide ships[22] added generous entomological contributions in the form of the red-legged ham beetle, *Necrobia rufipes* (De Geer); the buffalo carpet beetle, *Anthrenus scrophulariæ* (Linn.); the larder beetle, *Dermestes lardarius* Linn.; the hide and tallow dermestids, *Dermestes marmoratus* Say, and *D. vulpinus* Fabr.[23]; the white-marked spider beetle, *Ptinus fur* Linn., and no doubt a great many other insects which live in excrement, dried animal matter, and cereals. A native dermestid beetle, *Dermestes talpinus* Mann., was also widely distributed in these ships.

"John K. Townsend, the companion of the botanist, Thomas Nuttall[24] (who returned from California to Boston on the Brig

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[21] Beechey's Voyage, etc., Op. cit., vol. 2, p. 34.

[22] The whalers and fur ships obtained supplies from Bodega Bay, San Francisco, and Monterey, while the hide and tallow ships plied along the coast from San Diego to San Francisco Bay.

[23] "At one time the ravages of *Dermestes vulpinus* Fabr. were so great in the skin warehouses of London, that a reward of £20,000 was offered for an available remedy." Baird's Cyclop. Nat. Sci., London, 1858). Ent. News, vol. 1, p. 238 (1895).

[24] Thomas Nuttall, a distinguished English botanist, succeeded W. D. Peck as curator of the Harvard Botanic Garden in 1822. He remained until the winter of 1833-34, when he resigned to undertake this exploring and collecting trip to the Pacific Coast. He named a great many important California trees and other plants.

Pilgrim with R. H. Dana, Jr., in 1836), on his trip overland to the Pacific Coast, collected in the neighborhood of Fort Vancouver on the Columbia River during 1834-1835, and brought back on his return numerous insects to the Philadelphia Academy of Natural Sciences. Dr. Thaddeus William Harris described a number of these and sent the paper to the Academy for publication early in 1838, but it was never published. Three species of the *Cychrini*, *Cychrus tuberculatus* Harris, *Scaphinotus angulatus* (Harris) and *S. cristatus* (Harris), were, however, described in a later paper, 'Remarks upon the North American Insects belonging to the Genus *Cychrus* of Fabricius,' published January, 1839, in the Boston Journal of Natural History. In 1838, L. Reiche described the well known tiger beetles, *Omus dejeani* Reiche and *O. audouini* Reiche, collected in Oregon, in the Annals of the Entomological Society of France (VII, p. 297-302, 1838). Where he secured his specimens he does not state, but I am inclined to believe that they were collected by Townsend. The great expedition of Captain Charles Wilkes, 1838 to 1842, spent considerable time in Oregon and various members collected many insects there. These were stored with the other valuable material secured in Washington, where I believe most of it perished. There were only two specimens of that rich collection of insects that have survived as far as I know, *Callisthenes wilkesi* (Leconte) and *C. moniliatus* (Leconte), which fell into the hands of Dr. LeConte, who described them in 1851.[25] They are now preserved in the LeConte collection at the Museum of Comparative Zoology at Cambridge, Massachusetts. In connection with this great period, the great work of Sir John Richardson, the 'Fauna Boreali-Americana' should be mentioned. In the volume on insects, written by William Kirby and published in 1837,[26] many insects were described, which though not secured on the Pacific Coast, have a range which carries them to our Northwest Coast (and to California) and thus makes it impossible for one to study our northern fauna without consulting this classical work."[27]

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[25] LeConte, John L., Desc. of new species of Coleoptera from California, Lyceum of Nat. Hist. of N. Y., Ann. pp. 125-216 (1851).

[26] The Insects of Richardson's Fauna Boreali-Americana, IV (London, 1837), vol. 4, 325 pp., 8 pls.

[27] Van Dyke, E. C., From an unpublished paper entitled Early Entomologists on the Pacific Coast and their Work.

NOTES ON THE GENUS ROTHSCHILDIA IN THE UNITED STATES

(Lepid., Saturniidæ)

BY FOSTER H. BENJAMIN

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Dr. W. T. M. Forbes of Cornell University has called the attention of the writer to the confusion in the application of names to the species of *Rothschildia* found within the United States. In order to eliminate this confusion a résumé is given of the various names applied by prior authors. One new species and one new color form are described, one previously described form is recorded, and the synonymy of six other specific and varietal names is discussed.

ROTHSCHILDIA SPLENDIDA DeBeauvois

The only specimens belonging in the *splendida* group in the National Museum, excepting the Neotropical collections, are three examples received with the William Barnes collection. One of these is a male labeled "S. W. Texas 1906" and appears to be *erycina* Shaw with an incorrect locality label. A female, agreeing with this male, lacks data. The third specimen is a male labeled "Cochise Co., Ariz." and is *R. splendida mexicana* Draudt. Possibly this locality label is correct, but until other specimens are found the species should not be recorded from the United States.

Prior references to *splendida* from the United States are based upon specimens of *forbesi*, a new species described below, or upon specimens of *orizaba* Westwood, and are discussed under these names.

ROTHSCHILDIA ORIZABA Westwood

Most of the specimens in collections are of Mexican origin, almost all of the larger collections possessing unlabeled specimens which either emerged from Mexican cocoons, or were bred from eggs from Mexican stock. The species was extensively propagated in New York City about twenty years ago.

Single specimens are before the writer labeled "Texas" and "Ariz." The only example bearing definite data is a single female labeled Brownsville, Texas, VI-11, received with the Brooklyn

Museum collection. Even this record should be viewed as possibly erroneous until substantiated by additional specimens.

Hulst (1885, Ent. Amer., I, 160) stated that *splendida* and *orizava* (!) "were identical."[1]

ROTHSCHILDIA JORULLA Westwood

Specimens which agree thoroughly in all superficial characters with this Mexican species were received with the Brooklyn Museum collection, and were originally obtained by Jacob Doll and Carl Schaeffer on the Esperanza Ranch, about six miles southeast of Brownsville, Texas. The genitalia agree with those of Mexican specimens except for slight, and presumably insignificant, differences in the exact shapes of the harpes. Three of these Texas specimens are of the dark purplish form, typical *jorulla*, the only examples of this form from the United States and in the National Museum. Most of the Esperanza Ranch specimens show the red tones which distinguish form *guerreronis* Draudt. The latter is also represented in the National Museum by specimens labeled "Ariz.," but these labels may be incorrect.

The *Rothschildia* which is abundant in the Rio Grande Valley of Texas, and which has been labeled *jorulla* in recent collections is *forbesi*, a new species described below.

ROTHSCHILDIA JORULLA CINCTA Tepper

Attacus cinctus Tepper (1883, Bul. Brooklyn Ent. Soc., V, 65, ff. 1-2) was described from eight specimens, representing both sexes, reared from cocoons "found in Southern Arizona by Mr. Robert Driver." Three specimens, females, are in the National Museum, one being labeled in red ink "Arizona" "Original type." In superficial appearance *cincta* is almost identical with *maurusia* Draudt, but probably belongs in the *jorulla* complex. The name is certainly not strictly synonymous with typical *jorulla*, and until a series of males are obtained may be listed as a sub-species.

Rothschildia forbesi Benjamin, new species.

Closely related to *R. jorulla*, and superficially differing principally in the course of the extra discal line of the fore wing. The former species has this line outwardly oblique from somewhat below the costa to the hyaline discal spot, and usually produced to a point on each vein below the costal area; the new species has this line incurved in the region between the costa and the discal spot, slightly

[1] See notes under *R. forbesi*.

pointed on vein 7, and strongly produced to points only on veins 2 and 3. The average size of the new species is somewhat smaller than that of *jorulla*.

The male genitalia present conspicious differences. In situ *R. jorulla* has the harpe deeply cut on its ventral margin so that a long finger-like dorso-ventral arm occupies the distal portion, and the juxta is deeply excavated for the ædœagus. *R. forbesi* has the harpe only slight cut, the distal arm being a lobate tip rather than a finger-like process, while the juxta is simply bent around the ædœagus and is not excavated for the reception of that organ. *R. lebeau* Guérin has a juxta similar to that of *forbesi*, but the harpe is similar to that of *jorulla*. Other differences exist between the genitalia of the above named species, principally in the shape of the harpes, the unci, and the apices of the ædœagi.

Expanse: ♂, 88-100 mm.; ♀, 100-110 mm.

The new species occurs in two color phases, a dark form and a light form. These color forms may represent only dimorphism, or possibly represent local "wet" and "dry" forms depending upon whether the individuals breed in the humid bottoms which were once river courses or in the semi-desert areas. The types of *forbesi* are specimens of the dark form, the ground color being dark purplish tinted with olivaceous.

Holotype ♂ and allotype ♀, Brownsville, Tex., Mar. 1-7; 38 ♂ 24 ♀ paratypes from various localities in southern Texas, dates Feb. 2 to Nov. 9; also 1 ♂ and 1 ♀ paratypes, emerged in Washington, D. C., from cocoons from Monterey, Mexico, "7009, iss. July 1, 96" and "7009, iss. July 6, 97." Cat. No. 44085, U. S. N. M.

Types in U. S. National Museum; paratypes in U. S. National Museum, Cornell, Rummel, Fred Lemmer and Fritz Lemmer collections.

Egg: Described from unfertile eggs. White; broadly oval, flattened, smooth; length 1.8 mm., width 1.4 mm., height approximately 1 mm.

Larvæ: Described from alcoholic specimens supplied by Mr. Fritz Lemmer, the exact shades of the pale colors and of the greens obviously not available. Tubercles nearly uniform in size in each stage, excepting the last.

Stage 1. (from larva beginning to molt). Head diameter .8 mm. Head and body with the ground color pale; the former marked with a variable amount of fuscous-brown and black creating the appearance of a dark head with paler areas which include most of the front, reach across the epicranium and mark each side of the vertex. Otherwise the larva is colored much like Packard's figure

of first stage *R. cinctus* (1914, Mono. Bomb. Moths., III, pl. 4, f. 4) excepting that the black is more restricted, surrounding the lateral and dorsolateral body tubercles and giving the appearance of five longitudinal lines connected by cross bands on a yellowish ground.

Stage 2: Similar to stage 1 with the following exceptions. Length about 15 mm. Head about 1.3 mm. in diameter with the black so intensified that the pale areas appear as spottings on a black ground.

Stage 3. Length about 16 to 24 mm. Head about 2 mm. in diameter, otherwise similar to that of stage 2. Body almost entirely black excepting faint pale intersegmental lines and conspicious pale tubercles on pale bases; the general appearance being that of a black caterpillar with pale spottings.

Stage 4. Length about 28 mm. Head about 2.6 mm. in diameter. Larva similar to that of stage 3 but the pale areas extended and green or greenish, so that the head appears greenish with the black defining the sutures and laterally marking the epicranium. The body with black intersegmental areas, but dorsally appearing greenish with broken black median line; laterally the tubercular areas surrounded by black creating a checkered appearance.

Stage 4a? (judging from the head size apparently an adventitious molt). Length more than 40 mm. Head about 3 mm. in diameter, marked like that of stage 4. Body mainly leaf green with a few black markings; each leg black with yellow markings; each proleg strongly marked with black which encloses a pale patch, the pale patch on the base of the anal proleg large and neatly defined by jet black which forms a triangle with somewhat circular sides; a conspicious black patch on the prothorax including the shield and diffused ventrally to include the spiracle; a diffused lateral patch caudad of the tubercles of the mesothorax, attenuated dorsally; anal shield mainly black with a conspicious pale central marking shaped like an hour-glass; most of the tubercles paler than the body and equipped with black setæ, but the tubercle immediately above the leg on each side of each thoracic segment marked with black, conspicious on the first two segments, as two minute dots on each side of the third segment; caudal tubercle on the last abdominal segment more or less marked by black; a faint pale stripe on the dorsum of the second abdominal segment extending nearly to the spiracle; a similar but clearly defined stripe on each of the five following segments but extended to the tubercle; a similarly colored stripe beginning near the base of the ventral tubercle on the eighth abdominal segment and continuously extending caudally just below the ventral tubercles across the segments to the anal shield.

Last stage (stage 5?): Head about 4.3 mm. in diameter, colored like that of the preceding stage (termed 4*a*). Larva about 70 mm. in length; leaf green; the black markings of the legs and prolegs

similar to those of the preceding stage; no intersegmental black; prothoracic shield with a faint dorso-caudal black dot and with two caudal black bars, one defining each caudo-lateral margin; anal shield and the shield-like area at the base of each anal proleg shining greenish yellow strongly margined by neat jet black; all tubercles pale excepting those at the edge of the prothoracic shield which are distinctly tinged with fuscous, the normal tubercles all nearly of a uniform small size, the compound dorsal tubercle on the eighth abdominal segment inconspiciously the largest; pale body stripes similar to those of the preceding stage but much more conspicious.

Food plants: Willow; privet in confinement.

Notes: This species is the only one usually identified as *jorulla* in collections from the United States. It is the species upon which the first records of *splendida* from the United States are based, having been so misidentified by Clemens (1860, Proc. Acad. Nat. Sci. Phila., p. 160). It is the *splendida* of many of the early lists, but is not *splendida* of Hulst and several workers formerly living in or near Brooklyn, N. Y., who from about 1885 to 1900 or later distributed *orizaba* as *splendida*. It is also *erycina* in part of Packard and Cockerell (1914, Mono. Bomb. Moths, III, 257, pl. XLV, f. 3 and LXX, f. 3, but not pl. XLV, f. 4). The latter authors figured one of the Clemens specimens, but erroneously placed *splendida* DeBeauvois in the synonymy of *erycina* Shaw.

Rothschildia forbesi draudti Benjamin, new form.

To specimens with the ground color fawn, more or less tinted with red, the varietal name *draudti* is applied. This is a parallel form to *R. jorulla* form *guerreronis* Draudt.

Type, localities and number and sexes of types: Holotype ♂, Brownsville, Tex., "10-19"; allotype ♀ and 3♂, 1♀ paratypes, same locality, no date; 3 ♂ paratypes, same locality, "10-14," "10-17," "10-19"; 1 ♂ paratype, same locality, "7-11," (Geo. Dorner); 2 ♂ paratypes, San Benito, Tex., Apr. 24-30, May 1-7; 1 ♀ paratype, "ex pupa received from Texas, emerged in Washington after 2 years," and cocoon of same; 1 ♂ paratype, "7009, Mexico, iss. July 6, 97" (emerged in Washington, D. C., from cocoon from Monterey). Cat. No. 44086, U. S. N. M.

Types in U. S. National Museum; paratypes in U. S. National Museum, Cornell, and Fritz Lemmer collections.

Notes: The last mentioned male paratype was figured by Packard and Cockerell (l. c., p.. LVII, f. 1).

STUDIES AMONGST THE COCCINELLIDÆ, NO. 6—NEW SPECIES

BY F. W. NUNENMACHER

Piedmont, California.

Scymnus schuberti Nunenmacher, n. sp.

Form oval, pronotal and elytral outlines nearly continuous. Color black, with orange-yellow markings, last two ventral abdominal segments and legs testaceous. In the male the head, and sides of the pronotum narrowly orange-yellow, in the female these parts are entirely black. In both sexes each elytron has two orange-yellow dots, one small, rounded and median at one-third from base, the other irregular and a little larger at two-thirds, in line with the first.

Head impunctate, pronotum and elytra very thickly, minutely punctured and with a short, white pubescence. Ventral surface and legs minutely punctured. Length 1.25 mm.; width .75 mm.

Types, male and female, and seven paratypes in my collection.

Type locality: Benson, Arizona, collected by myself on October 4, 1906. Three of the paratypes are from the type locality; two from Placerville and two from Shasta, California, all taken by myself.

Var. A. In all respects the same as the type with the exception that only the anterior spot on each elytron remains, the other being entirely obsolete. Two specimens, one from Shasta, the other from Humboldt County, California, taken by myself.

Schuberti belongs to Group B, of Horn's table, the metacoxal line following the first suture. It has almost the same markings as *S.myrmidon* Muls. which belongs in Horn's Group A. *Schuberti* may be in collections under the name *guttulatus* Lec., in the latter the spots are somewhat double, seldom round. I dedicate this species to my friend, W. H. Schubert.

Scymnus scotti Nunenmacher, n. sp.

Form oval, outline continuous. Black with color markings disposed as follows: Head ferruginous in both sexes, pronotum black, front narrowly, sides broadly, ferruginous; each elytron with a broad vitta starting at the callous and running toward the suture and to three-fourths the length, where it widens out from margin to suture and apex. Head and pronotum finely punctured. Elytra with a short whitish pubescence; punctation a little coarser. Ven-

tral surface black, thickly and coarsely punctured, post-coxal plates also coarsely punctured. Legs ferruginous. Length 1.5 mm.; width 1 mm.

Types, male and female, and one paratype in my collection.

Type locality: Alhambra Valley, Contra Costa County, California (F. T. Scott); paratype, Vine Hill, Contra Costa County, June 26, 1908 (F. E. Blaisdell).

Scotti belongs in Group D of Horn's table, the metacoxal line complete, making a full arc.

Scymnus quercus Nunenmacher, n. sp.

Form oval, outline nearly continuous. Color ferruginous throughout and clothed with a short white pubescence. Pronotum and elytra thickly and very minutely punctured. Ventral surface fuscous, legs and last four abdominal segments testaceous; punctures hardly visible. Length 1.25 mm.; width .75 mm.

Types, male and female, and four paratypes in my collection, kindly presented to me by Dr. F. E. Blaisdell.

Type locality: Vine Hill, Contra Costa County, California. Collected by F. E. Blaisdell, November 25, 1910, from Live Oak (*Quercus agrifolia* Neé).

This species comes under Horn's table in Group C, the metacoxal line curving but not making a full arc. It resembles *S. debilis* Lec. somewhat in size and color; *debilis* belongs to Group A.

Hyperaspis biornatus Nunenmacher, n. sp.

Color black with yellow markings: One large spot on each elytron a little behind the middle, close to the margin, but not touching it; another small juxta-apical spot joined together by a narrow band giving it the appearance of a dumb-bell. Head yellow, pronotum with the sides broadly yellow, surface finely and rather closely punctured; elytra a little more coarsely punctured. Ventral surface rather coarsely punctured. Anterior legs yellow, the others black, tarsi piceous. Described from the male. Length 3 mm.; width 2.25 mm.

Type, a male in my collection.

Type locality: Livermore Hills, Alameda County, California. Collected by Kenneth Masero in June, 1933.

Biornatus can readily be separated from *H. lengii* Schaeffer, by the spots being behind the middle and closer to the margin; in *lengii* they are larger, wider apart and the anterior spot is in the center of the elytron.

Hyperaspis leachi Nunenmacher, n. sp.

Form convex oval. Color shining black, a large orange spot involving the whole of each elytron, excepting a small band at the basal margin, the callus (in the male,) a narrow sutural line that widens out at apex of the elytron and a very narrow bead the length of the margin, black. Head punctured, yellow in the male and black in the female. Pronotal front very narrowly, sides broadly yellow; surface rather thickly and finely punctured, the punctation denser and coarser than on the elytra. Ventral surface entirely black and finely punctured. Anterior legs yellowish, the posterior black with the knees and tarsi yellow. Length 2.20 mm.; width 1.75 mm.

Types, male and female, and one paratype in my collection.

Type locality: Riverside County, California, collected by E. R. Leach on March 25, 1918. Paratypes females: one in the collection of F. E. Blaisdell, Museum of the California Academy of Sciences, collected at San Diego, California; the other was taken in Sonoma County, California, by Dr. Blaisdell, on July 10, 1902.

H. leachi will follow *panzosæ* Gorh. in our lists.

Hyperaspidius horni Nunenmacher, n. sp.

Color testaceous, with a small triangular spot at each side of the scutellum dark brown. The female is a little darker. Pronotum polished and finely punctured. Elytra rather coarsely punctured. Ventral surface very finely punctured. Length 2 mm.; width 1.25 mm.

Types, male and female in my collection.

Type locality: Buena, N. J., without any other data (Chas. Liebeck).

The locality of the female cannot be made out, but it is dated July 1, 1894, collected by F. Knab. The male of this species was labeled "n. sp." by Dr. Geo. Horn.

Hyperaspidius mexicanus Nunenmacher, n. sp.

Described from the male. Color light testaceous and rather transparent, with black markings. Pronotum black, front and sides narrowly bordered with testaceous. Pronotum and elytra very finely and thickly punctured. Elytra with a narrow black vitta on the suture, which starts at the anterior end of the suture where it is widest, extends posteriorly three-fourths the length, where it ends in a point.

Head and mouth-parts testaceous. Ventral surface black, very finely and thickly punctured. Legs testaceous. Length 2 mm.; width 1.17 mm.

Type, a male in my collection; one male paratype.

Type locality: Mexico, October, 1907. There were several specimens in the Albert Koebele collection.

Microweisea ovata Nunenmacher, n. sp.

Described from a male. Color shining black, polished. Head, mouth-parts, anterior angles of pronotum, front legs and ventral segments, testaceous. Elytra finely and thickly punctured. Length 1.25 mm.; width .8 mm.

Types, male and female in my collection. Two paratypes in the collection of F. C. Hadden.

Type locality: Blairmont, B. G., S. America, collected September, 1928, by F. X. Williams. One cotype was taken in January, 1924, at Campus Rio de Janeiro, Brazil.

Adalia nigromaculata Nunenmacher, n. sp.

Color black with yellow markings. Head and mouth-parts yellow; base of the head from eye to eye black, the yellow extends into this black in the form of a three pointed crown with the middle spur the longest. The pronotal pattern is somewhat the same, with the sides yellow, and broadest at each angle with the center narrow giving it a crude crescent shape. In the female there is a small yellow dot on the thorax in front of the scutellum.

The elytral markings are a little different in all the seven specimens before me and are best described by saying that the yellow starts narrowly at the anterior margin, widening at the callus into a fascia at about one-third of the length, curving towards the suture but not reaching it, leaving a black line, the end at the suture rounded, then curving back to the margin where it widens into a broad square angle following the margin.

Elytra a little more densely and coarsely punctured than the head and pronotum. Elytral pattern somewhat as in *Psyllobora germari* Muls. Epipleuræ yellow, the tibiæ and tarsi pitchy black. Length 3.5 to 4 mm.; width 2 to 2.5 mm.

Types, male and female in my collection and four paratypes in that of F. C. Hadden.

Type locality: San Diego County, California, without other data, G. H. Field collector.

Ceratomegilla cottlei Nunenmacher, n. sp.

Described from a male. Color light yellow and black. Head black with a small triangular yellow spot in the center; surface thickly and rather coarsely punctured. Pronotum black, narrowly

edged with yellow, thickly and finely punctate. Elytra yellow with the suture edged with black, a broad vitta on each which is one-third the width of the elytron, starting at the base in the center, slowly broadening and extending three-fourths the length of the elytron where it is broadest, then narrowing to a blunt point but not reaching the elytral apex, leaving the tip yellow. Under surface and legs black, strongly punctate; pubescence short and white.

In the other two forms: *C. vittata* Mann. and C. *vittata* var. *similis* Casey, the vittæ reach the elytral tips. Elytral punctation about the same as that of the pronotum. Length 5 mm.; width 3 mm.

Type, a male in my collection.

Type locality: Yellowstone Park, collected July 8, 1930, by E. R. Leach. Kindly presented to me by the collector.

Hippodamia hoppingi Nunenmacher, n. sp.

Color yellow with black markings disposed as follows: Head black, with a small triangular yellow spot in the center. Pronotum black, the narrow front margin, excepting a small central point, and the anterior angles more widely, yellow, the yellow at the angles not connected with the margin. Elytra with a broad fascia and a somewhat kidney-shaped spot, black; the fascia begins at the callus, where it is rounded and broadest, and extends to the suture just back of the scutellum. The subapical spot is arcuate, larger and flexed inwardly, but does not touch the suture in any of the six specimens before me.

Head and pronotum thickly and finely punctured. Elytra a little more coarsely punctured. Ventral surface black; legs black and punctured a little more finely than the elytra. Length 4 mm.; width 3 mm.

Types, male and female, and four paratypes in my collection.

Type locality: Mt. Stillman, Tulare County, California, elev. 10,000 ft. The types were collected August 3, 1904, and one paratype at Franklin Lake on July 10, 1912, all by Mr. Ralph Hopping. This pretty little species was kindly given to me some years ago by my friend, Mr. Hopping.

A Correction

On page 159 of the October number of this journal the names of *Nomia californica* Ckll. and *Xenoglossodes eriocarpi* Ckll. became reversed. The Nomia was from Idaho and the Xenoglossodes from Arizona. Also on page 185, line 14, the word "bololorus" should read "bicolorous".

A NEW BROCHYMENA

BY E. P. VAN DUZEE

Brochymena pilatei Van Duzee, n. sp.

Allied to *sulcata*, longer, paler in color, wanting the scattering black punctures and with different male claspers. Length 13 mm.

Head distinctly arcuate before the eyes, about rectilinear in *sulcata*; cheeks exceeding the tylus, sometimes somewhat connivent but rarely touching before its apex. Pronotum about as in *sulcata*, sides sinuate, dentate for their whole length, the teeth being smaller on the humeral lobe. Scutellum less elevated and narrower behind the frenum; membrane reticulate with fulvous-brown instead of black, these reticulations nearly obsolete at times; antennæ and feet as in *sulcata*; puncturation of upper surface irregularly distributed but more uniform in size than in *sulcata*, a few about the base of the scutellum being larger and black, the scattering large black punctures found on the pronotum in *sulcata* being wanting in *pilatei*. Last ventral segment of male sulcate as in *sulcata*, the fringe of long hairs heavier and nearly meeting over the smooth depressed area; claspers somewhat shoe-shaped, broader and more triangular than in *sulcata* with a distinct heel, narrower with rounded angle in *sulcata*.

Color paler, with a fulvous-brown effect, produced by the castaneous punctures on a yellowish ground color, with a few pale calloused spots, especially on the elytra; antennæ back with pale incisures; beneath yellowish ferruginous, the pectoral pieces with groups of black punctures laterally; sides of cheeks below, a broken annulus on apex of femora, an apical annulus and about three spots on the tibiæ and the apex of the tarsi black; vestiture beneath pale, of short hairs on the venter but mixed with long ones on the legs.

Holotype, male, No. 3839, and allotype, female, No. 3840, Calif. Acad. Sci. Ent., taken at El Centro, Imperial County, California, January 26, 1910, by G. R. Pilate and presented to the Academy of Dr. E. C. Van Dyke. Paratypes a long series with same data. Dr. F. E. Blaisdell has also taken this species at El Centro, December 4, 1927, and Mr. H. Gentry has taken it at Phoenix, Arizona, July 10, 1932. I have had specimens of this form in my own collection for many years that were taken by Mr. C. R. Biedermann at Florence, Arizona, June 8, 1903, and one from Phoenix taken March, 1897, but my material was not sufficient for properly distinguishing the species.

A SHORT REVIEW OF THE GENUS ATIMIA WITH THE DESCRIPTIONS OF TWO NEW SPECIES

BY E. GORTON LINSLEY

Oakland, California.

The genus *Atimia* is interesting because of the Lamiid-like aspect of its species. Their appearance is quite unique among the Cerambycinæ, but they are included in that subfamily because of the absence of an oblique groove on the anterior tibiæ. In the larval stage the various members of the genus attack trees of the Cupressaceæ and Taxodiaceæ, including *Cupressus, Libocedrus, Thuja, Chamæcyparis, Juniperus, Taxodium, Sequoia*, and their relatives. Three species have been previously described and these with the two characterized below bring the number of known species to five. These may be distinguished as follows:

Denuded areas of elytra irregular or vittiform, somewhat confluent 1

Denuded areas of elytra round, separate, not confluent; elytral apices obliquely truncate. 9-14 mm. Arizona, New Mexico ..... (1) *huachucæ* Ch. & Kn.

1. Elytral apices emarginate, the angles often dentiform 2

   Elytral apices rounded or truncate 3

2. Prothorax more or less quadrate; thoracic vittæ subparallel; denuded areas of elytra vittiform. 6-12 mm. Pacific Coast of North America ..... (2) *dorsalis* Lec.

   Prothorax rounded at the sides; thoracic vittæ arcuate; denuded areas of elytra irregular, narrow, not vittiform. 8-10 mm. Eastern North America ..... (3) *confusa* Say

3. Reddish brown, pubescence pale luteus; prothorax one-fourth wider than long; antennal segments slender throughout; elytral apices truncate. 11-12 mm. Central Mexico ..... (4) *mexicana* n. sp.

   Dark brown, pubescence yellowish brown; prothorax nearly one-half wider than long; outer antennal segments distinctly flattened; elytral apices rounded. 8-12 mm. Central California ..... (5) *helenæ* n. sp.

1. ATIMIA HUACHUCÆ Champ. & Knull

This species is readily known by the round, separate, denuded areas of the elytra. In average size it is larger than any other known species. It occurs in southern Arizona and New Mexico on the Arizona Cypress, *Cupressus arizonensis.* In addition to those localities listed by Champlain and Knull, I have seen examples from Mt. Washington, near Nogales, Arizona, July 11 and 12, 1919 (Van Dyke collection, Calif. Acad. Sciences), Chiricahua Mts., Arizona, July 7, 1908 (Calif. Acad. Sciences coll.), and Carr Canyon, Huachuca Mts., Arizona, July, 1930 (collection of the writer).

2. ATIMIA DORSALIS LeConte

This is a fairly abundant species on the Pacific Slope, where it occurs from San Diego to British Columbia, attacking *Cupressus, Thuja, Libocedrus, Sequoia,* and other related trees. It is somewhat smaller than the preceding and differs from it in the confluent, vittiform, denuded areas of the elytra. The elytral apices are emarginate or emarginate-dentate, with the angles sometimes spiniform. The body is usually clothed with luteus pubescence, but examples apparently referable to this species from Oregon have pubescence varying from almost uniformly black to rufous.

ATIMIA CONFUSA Say

A. confusa is a well known species occurring in eastern North America from Texas to Canada. In general it is shorter and stouter than any of the other known species, with the sides of the prothorax rounded and the thoracic vittæ arcuate. The elytral apices are emarginate with the outer angle often acute, and the denuded areas of the elytra narrow and irregular.

4. Atimia mexicana Linsley, new species

Stout, reddish-brown, clothed with coarse luteus pubescence. Head short, broad, rather densely pubescent, with a smooth longitudinal vitta on the vertex; antennæ two-thirds as long as the body (♂); scape stout, not longer than second and third segments together, second segment small, about half as long as third; third segment about two-thirds as long as fourth, fourth segment shorter than fifth, remaining segments slender, subequal. Prothorax one-

fourth wider than long, subquadrate, coarsely and moderately densely punctured, densely clothed with luteus pubescence, with two smooth parallel vittæ. Elytra at base wider than prothorax, rather suddenly narrowed toward apex; punctation fine, uneven, not dense; denuded areas narrow, irregular, not vittiform; apices truncate. First segment of the posterior tarsi as long as second and third segments together. Lower surface sparsely clothed with luteus pubescence; abdominal segments each with two dense patches of pubescence at sides, separated by a smooth vitta. Length 11 mm., breadth 3.5 mm.

Holotype male, (C. A. S., Ent. No. 3726) and one paratype male, (in the collection of the writer) taken at Real d'Arriba, District of Temascaltepec, Mexico, June, 1933, by Mr. Howard Hinton and Mr. Robert Usinger. Both specimens were taken on *Thuja occidentalis.*

This fine species is somewhat suggestive of *A. confusa* in color and elytral pattern but may be distinguished at once by its greater size, elongated form, parallel thoracic vittæ and truncate elytral apices. This last character will also separate it from *A. dorsalis* which has parallel thoracic vittæ but which differs in elytral pattern.

5. Atimia helenæ Linsley, new species

Short, stout, piceous, clothed with a coarse yellowish-brown pubescence, with large denuded areas on the prothorax and elytra. Head short, broad; eyes large, finely granulated; antennæ short, scape stout, almost cylindrical, longer than the second and third segments together, second segment small, a little less than one-half as long as the third, third about two-thirds as long as fourth, fourth slightly shorter than fifth, remaining segments shorter, subequal, flattened and compressed. Prothorax transverse, subquadrate; irregularly, finely punctured; sparsely clothed with yellowish-brown pubescence, with two arcuate longitudinal vittæ; posterior angles acute. Scutellum about as long as broad, densely pubescent. Elytra gradually narrowing posteriorly; punctation fine, sparse, irregular; denuded areas confluent, more or less vittiform; apices rounded. Legs short; first segment of posterior tarsi not equal in length to the following two together. Lower surface rather sparsely pubescent. Length 8.75 mm., breadth 3 mm.

Holotype male, (C. A. S., Ent. No. 3727), collected at Cypress Ridge, Marin Co., Calif. on April 6, 1921, by Dr. E. C. Van Dyke; allotype female, (C. A. S., Ent. No. 3728), also from Cypress Ridge, April 26, 1921, taken by Mr. J. O. Martin; and

one paratype male, Pope Valley, Napa Co., Calif., April 1, 1932, E. C. Van Dyke, collector. All three specimens were taken on *Cupressus sargentii* Jepson, and the species probably occurs throughout the St. Helena region.

At first glance, this species might be taken for the melanic phase of *A. dorsalis*, but differs from that as well as all other known species in the rounded elytral apices, the stout cylindrical antennal scape which is longer than the second and third segments together, and the broad, flattened outer segments of the antennæ. In addition, the first segment of the posterior tarsi is smaller than that of *A. dorsalis*, being shorter than the two following segments together. This is the third recently described longicorn that is apparently restricted to the peculiar Sargent Cypress, which grows only in a few limited areas on serpentine ridges in the California foothills.

Necrology

California entomology recently has lost by death three of its workers. The passing of William Sherman Wright took one of our more active lepidopterists. Mr. Wright was born at Hardin, Illinois, April 23, 1866, and died at Laguna Beach, California, July 8, 1933. Most of his entomological work was done about San Diego, California, and it was there that the present writer first met him and learned to appreciate his sterling worth and his sincere friendship. His principal work was done on the moths, especially the Geometridæ, but he collected faithfully the butterflies of San Diego County and recently had published a revision of his San Diego County list. A fuller sketch by Prof. Essig will be found in Entomological News for January, 1933, from which some of these facts were taken.

The death on October 23, 1933, of Mr. J. G. Grundell took one of the group of earlier lepidopterists of San Francisco. A sketch of his life will be found on page 48 of this issue.

Mr. J. August Kusche, who died on March 3, 1934, after a lingering illness, was a general collector who took a special interest in the insects and added largely to our local collections. A fuller notice will appear in an early number of this journal. —E. P. Van Duzee.

TWO GENERA OF APHODIINÆ NEW TO MEXICO
(Scarabaeidæ, Coleoptera)

BY HOWARD E. HINTON

Berkeley, California

This paper, the first of a series, is the result of a study of the beetles of the sub-family Aphodiinæ in the collections of the United States National Museum and of the writer. The writer is indebted to Dr. E. A. Chapin and Dr. E. C. Van Dyke for their generous assistance in the preparation of this paper.

Genus *Euparixia* Brown

The anomalous genus *Euparixia* was erected by Brown (1927) for a singular little Scarab, *E. duncani*, found in Arizona. In the collection of Mexican and Central American Aphodiinæ sent to me for study from the United States National Museum, there is a specimen of the above species collected by J. A. Kusche at Venidio, Sinaloa, Mexico, on May 17, 1918. *Euparixia duncani* has remained until now without a congener.

Euparixia formica Hinton, new species

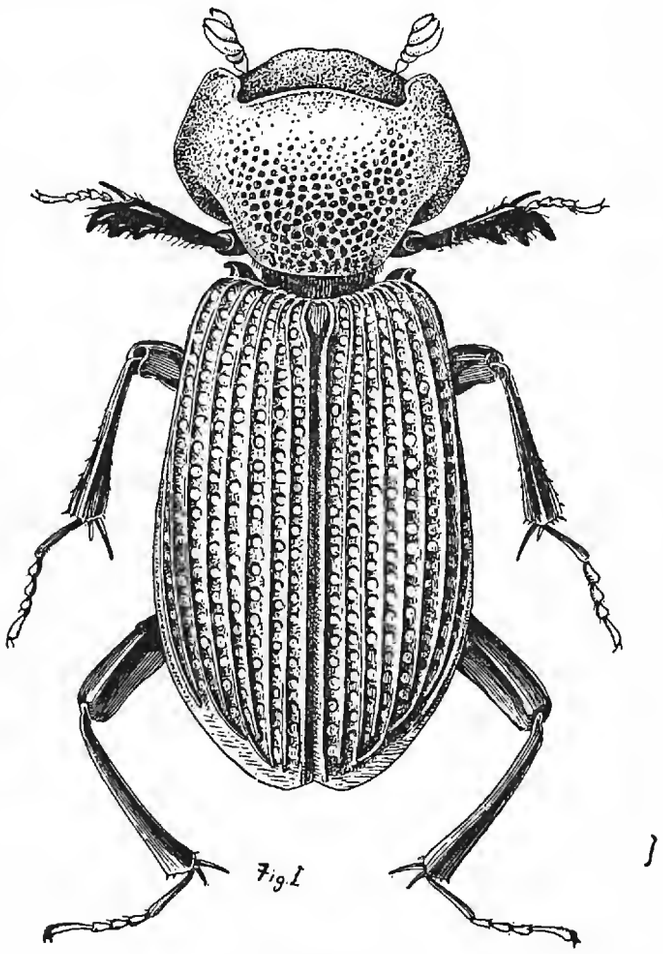
Elongate, convex, piceous, feebly shining; mouth-parts and anterior legs paler. Head moderately convex, basal two-thirds coarsely, densely punctate, with the extreme base more coarsely punctate, apical one-third impunctate, finely, moderately densely granulate; anterior margin of clypeus broadly and feebly emarginate when viewed from above, apex inflexed and rounded, not visible from above, sides oblique nearly to the genæ, and broadly incised before them; genæ angular, prominent.

Prothorax one-fourth longer than wide, very convex; front angles broadly rounded, prominent; side margins broadly explanate anteriorly, less explanate and more reflexed posteriorly, converging abruptly from basal one-half to constriction at basal one-fourth; the angles thus formed broadly rounded, those formed by the constriction extremely broadly rounded or nearly obliterated; surface remarkably unequally, coarsely, densely punctate at base, the punctures becoming much finer toward apex; sides nearly impunctate.

Elytra widest at apical one-third; carinæ evenly raised, about one-fourth as wide as striæ; striæ with a single row of evenly spaced, deep, coarse punctures. Scutellum elongate, triangular.

Mesosternum coarsely, densely punctate anteriorly, nearly impunctate posteriorly; extending between the middle coxæ is a low longitudinal carina; metasternum moderately punctate with a

wide, shallow, longitudinal sulcus. Ventral abdominal segments coarsely, irregularly punctate, each with a row of remarkably large punctures on the depressed anterior margin; penultimate segment narrowed at middle; posterior margin of last ventral and last dorsal segment nearly impunctate, polished. Posterior face of anterior femur and trochanter coarsely, closely punctate; anterior face highly polished; basal area of femur with a few long testaceous hairs, densely, coarsely punctate; front tibiæ with a few indistinct punctures on anterior face, outer margin with a few short setigerous hairs; posterior tibiæ with spurs unequal; first segment of hind tarsus subequal in length to the three following. Length, 4.5-5.5 mm.; breadth, 2-2.5 mm.



(Fig. 1)

Type (No. 3752, Mus. Calif. Acad. Sci.) and five paratypes were taken by R. L. Usinger and the writer at Tejupilco, District of Temascaltepec, Mexico, in June 1933, at an elevation of 3,960 feet. A paratype has been deposited in the collection of Mr. Saylor. One specimen was taken at light, and the others were taken from the refuse thrown out of the nests of the leaf cutting ant, *Atta sexdens* L.

This species may be separated from *Euparixia duncani* by its broadly rounded, non-prominent hind pronotal angles.

Genus *Rhyssemus* Muls.

Up to the present time, close to sixty-eight species of this cosmopolitan genus have been described. Of these five are known from North America. The following description makes known the sixth species:

Rhyssemus mexicanus Hinton, new species

Oblong, moderately convex, black, opaque; antennæ testaceous, legs rufo-piceous.

Head two-thirds as wide as the pronotum, moderately convex, tuberculate, with the tubercles coarser anteriorly, finer and denser posteriorly; vertex with a large oval tubercle on each side; clypeus broadly, moderately deeply emarginate, angle on each side obtuse, rounded, prominent; sides scarcely arcuate, slightly incised before genæ; genæ obtusely rounded, not prominent.

Prothorax one-third wider than long, slightly narrowed anteriorly, apical angles obtuse, sides slightly arcuate, lateral margins crenate, basal angles nearly obliterated, base feebly arcuate; disk with five transverse ridges which are well separated from the lateral margins; apical ridge very indistinct and consisting of a row of coarser tubercles, basal four ridges much more distinct and not broken up into tubercles, basal two interrupted at middle by a broad median channel, the second from the base turning and bordering the channel on each side nearly to base and then continuing for a short distance along the base between it and first basal ridge; areas between ridges moderately densly tuberculate; area near apical margin paler and obsoletely tuberculate.

Elytra subparallel, slightly wider posteriorly; each elytron with nine (including sutural) strongly raised, interrupted carinæ, alternate carinæ more strongly raised, and all becoming more interrupted posteriorly, ninth extending only half way to apex; striæ with a single row of widely spaced, coarse, shallow punctures.

Body beneath opaque, rugulose; mesosternum with a fine, high carina between the middle coxæ; metasternum with a wide, deep, longitudinal sulcus. Ventral abdominal segments opaque, rugulose, anterior margin of each segment crenate. Posterior tarsus with the first segment equal to the long spur and sub-equal to the three following. Length, 3 mm.; breadth, 1.2 mm.

Type (No. 3814, Mus. Calif. Acad. Sci.) and eleven paratypes were collected by R. L. Usinger and the writer at Tejupilco, District of Temascaltepec, Mexico, in June 1933, at an elevation of 3,960 feet. One paratype has been deposited in the collection

of the United States National Museum. All specimens were taken in rubbish near the margin of a stream, and all were covered with a stony incrustation which had to be removed before the sculpturing could be observed.

This is quite distinct from all other described North American species on account of its strongly raised and cariniform, instead of flat and tuberculate, elytral intervals. The following key will separate the North American species:

1. Elytral intervals strongly raised, cariniform; ventral abdominal segments opaque, entirely rugulose.....*mexicanus* n. sp.
   Elytral intervals not cariniform; ventral abdominal segments not entirely rugulose, often smooth and shining..... 2
2. Elytral intervals with one row of tubercles..... 3
   Elytral intervals with two rows of tubercles..... 4
3. Pronotal depressions tuberculate, not punctate *neglectus* Brown
   Pronotal depressions punctate, not tuberculate *puncticollis* Brown
4. Outer row of tubercles forming a fine, elevated, cariniform line .....*scaber* Hald
   Outer row of tubercles not forming a cariniform line..... 5
5. Clypeus nearly acute each side of emargination; intervals with rows of tubercles nearly equal; slightly elongate.....*sonatus* Lec
   Clypeus obtuse each side of emargination; intervals with the inner row of tubercles more elongate and less closely placed, outer row with tubercles smaller and more closely placed *californicus* Horn

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A NEW SPECIES OF WEST INDIAN TYTTHONYX

(Coleoptera: Cantharidæ)

BY HOWARD E. HINTON

Berkeley, California

Tytthonyx bicolor Hinton, n. sp.

Male. Elongate; clothed above and beneath with sparse pale pubescence; head above and beneath black; prothorax, mesothorax, metathorax, and abdomen reddish-yellow above and beneath; elytra, wings, legs, and antennæ black; scutellum yellow.

Antennæ long, about three-fourths the length of the body, black, strongly serrate, densely pubescent; first joint twice as long as second, joints one to two not compressed, two to four gradually increasing in length, four to eleven subequal, last joint brownish, compressed, not oval. Head black above and beneath, sparsely pubescent with pale hairs, finely rugulose; clypeus arcuately produced; mouth parts slightly infuscate; palpi black, last joint stout, acumi-

nate, and twice as long as preceding; mandibles dark testaceous, toothed on apical half; eyes globular, prominent, widely separated, finely faceted.

Pronotum subrectangular, nearly twice as broad as long, narrowed in front, anterior and posterior angles broadly rounded, front truncate, base feebly sinuate at middle, a deep median impression extending from the posterior nearly to the anterior margin, margins strongly raised; reddish yellow, shining, sparsely pubescent, irregularly and very sparsely punctate. Scutellum yellow, subquadrate, truncate at apex. Elytra black, short, just reaching the first ventral segment of abdomen, sparsely pubescent, feebly dehiscent, apices separately rounded; basal four-fifths coarsely rugulose, two indefinite, obsolete discal carinæ on each elytron; apical one-fifth evenly and more finely rugulose.

Legs slender, moderately pubescent, black; coxæ, trochanters, and extreme base of femora yellowish; penultimate joint of tarsi divided. Body beneath yellowish, sparsely pubescent; penultimate abdominal segment deeply, widely, somewhat triangularly emarginate; last abdominal segment completely divided, the genitalia lying in the cavity formed by these last two segments. Length 6 mm.

Female. Unknown.

Holotype, male No. 3745 Mus. Calif. Acad. Sci., collected at Mayaguez, Puerto Rico, June 2, 1932, by F. Mora. For this specimen I am indebted to Professor Stuart T. Danforth of the University of Puerto Rico.

Viewed dorsally, the last abdominal segment, the seventh, is deeply, widely, and roundly emarginate at the apex. On each of its apical angles (formed by the sides of the segment and the sides of the emargination) there is a prominent, conical, tubercular knob on the tip of which there is, apparently, a spiracle. From a dorsal view the last ventral abdominal segment, the eighth, is narrowly, and triangularly incised.

By the structure of the last abdominal segments, this species is more closely related to *Tytthonyx discolor* L. & M.[1] and *T. marginicollis* Mutchler[2]. From *T. discolor* it may easily be separated by its larger size, different coloration, compressed last joint of the antennæ, and by the fact that in this species the seventh abdominal segment is deeply, somewhat triangularly emarginate instead of being only shallowly, arcuately emarginate. From *T. marginicollis* it may be separated by its larger

[1] Leng, C. W. and Mutchler, A. J. The Lycidæ, Lampyridæ and Cantharidæ (Telephoridæ) of the West Indies. Bull. Am. Mus. Nat. Hist. Vol. XLVI, Art. VIII, p. 490, fig. 54, 54a (p. 487), 1922.

[2] Mutchler, A. J. Notes on West Indian Lampyridæ and Cantharidæ (Coleoptera) With Descriptions of New Forms. Am. Mus. Novitates No. 63. p. 8, 1923.

size, by the structure and color of the antennæ, the yellow instead of blackish pronotum and the black instead of yellow legs. The following simple key will serve to separate the West Indian species.

A. Last abdominal segment completely divided.
  B. Pronotum entirely yellow.....*bicolor* n. sp.
  BB. Pronotum blackish.
    C. Antennæ black.....*discolor* L. & M.
    CC. Antennæ light brown.....*marginicollis* Mutchler
AA. Last abdominal segment not completely divided.
  B. Pronotum yellow.....*cubanus* L. & M.
  BB. Pronotum blackish.....*cavicornis* L. & M.

The June Meetings at Berkeley

The Entomological Society of America will hold at least one session in connection with the summer meetings of the American Association for the Advancement of Science and affiliated societies for 1934 at Berkeley, California, June 18 to 23. The present plan is to have the Pacific Coast Entomological Society and the Lorquin Entomological Club participate in a joint meeting with the Entomological Society of America, with a program so arranged that an afternoon may be spent at the rooms of the Entomological Department of the California Academy of Sciences in San Francisco. It is hoped that a goodly number of our eastern entomologists can improve this opportunity to visit the Pacific Coast and meet with their western co-workers. Those who do come should plan so they can spend a few days in the San Francisco area before or after the meetings. They will find much to interest them, not only in the bay cities but in the country within easy reach from Berkeley, and certainly will regret it if they restrict their stay here to the actual time of the meetings. The rooms of the Entomological Department of the California Academy of Sciences, located in Golden Gate Park in San Francisco, will be open throughout the meetings and a cordial invitation is extended to all visiting entomologists to inspect the collections, now numbering almost one million mounted specimens, and to make use of its facilities for study.—E. P. Van Duzee.

A NEW PREDACIOUS MITE FROM SOUTHERN CALIFORNIA

(Acarina, Erythræidæ)

BY WALTER EBELING

Citrus Experiment Station, Riverside, California

In the course of several years of experimental work in Orange County, involving the careful examination of the branches of hundreds of lemon trees heavily infested with red scale, the writer has had an excellent opportunity to study the predacious mites infesting citrus trees. Several species he believes to be undescribed, and one of special interest is described in this paper.

Unfortunately only ten specimens of the species in question were preserved in permanent mounts. These are either all of the same sex (presumably female) or, if of different sexes, no significant differences in size of body or shape and size of the genital opening have been noticed.

Erythræus aonidiphagus Ebeling, n. sp.

Color red, or with iridescence predominantly greenish or bluish; legs red. Body 1.75 to 2 mm. in length; less than half as broad as long, broadly rounded before and behind and densely covered with many fine hairs. Dorsal groove short, reaching only as far back as the eyes, with a pair of pits or sensillæ at each end, each bearing a long spine, two eye spots on each side of the cephalothorax. Palpi 0.35 mm. in length, broad; thumb broad, not clavate, covered with many hairs; claw extending beyond thumb, only slightly curved at tip. Legs I and IV subequal, not as long as body. Fourth and fifth joints of leg I subequal and longer than the third joint; tarsus four-sevenths as long as the tibia and greatly swollen. Fifth joint of leg IV slightly longer than preceding joint; tarsus swollen, slightly less than one-half as long as the tibia.

The types and paratypes are in the author's collection.

There are at least thirteen species of *Erythraeus* described from the United States. Four were described from California, two of which (*E. mœstus* [Banks] and *E. posticatus* Banks) have been found on citrus.

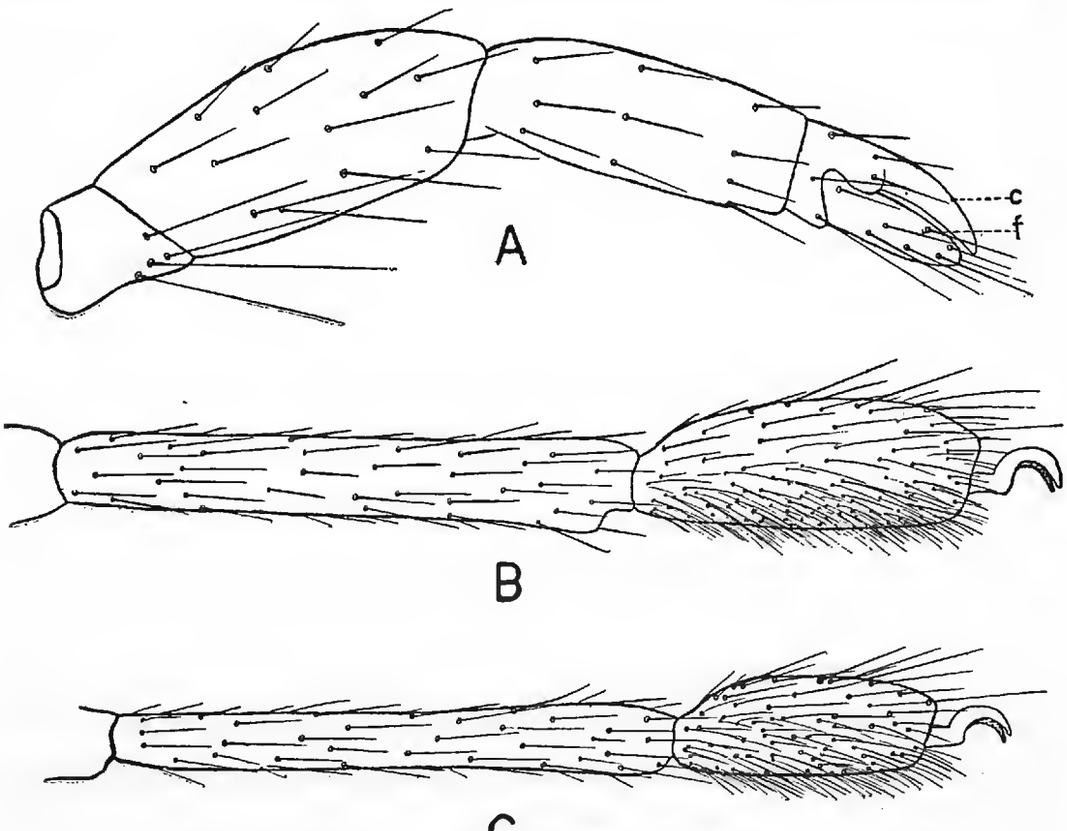
Erythræus aonidiphagus differs from *E. mœstus* in that the body is broadly rounded in front; the dorsal groove reaches only to the level of the eyes; there are two eye spots on each side of the cephalothorax; legs I and IV are not as long as the body; the claw of the palpus is not greatly curved, and the thumb is three times as long as broad. It differs from *E. posticatus* in that it has two eye spots on each side of the cephalothorax; legs

I and IV subequal, both shorter than the body; tarsus I more than two-thirds as long as the metatarsus, tarsus IV nearly half as long as the metatarsus; third segment of the palpus longer than the fourth and fifth, and the thumb not clavate and not reaching beyond the end of the claw.

These mites are not ordinarily abundant and the writer has found them only in certain groves. As high as thirty mites were found on a single tree, but ordinarily only one or two, if any, are found. They may also be seen running about on the ground beneath the trees, which may, in part, be due to the difficulty they experience in clinging to the foliage.

Attempts to breed the mites have failed and the method of reproduction is unknown. They are cannibalistic and if a number are left together in a sealed container invariably only one live mite will remain after a day or two.

The writer once observed a mite thrusting its mandibles and finally its entire cephalothorax beneath the armor of a red scale and feeding on the body of the insect. These mites also prey on red scale crawlers and other small insects and mites. If more abundant, they might be an important enemy of the red scale.



Description of Figure

Erythræus aonidiphagus n. sp. A, palpus; B, last two joints of Leg I; C, last two joints of leg IV; c, claw; t, thumb.

NEW SPECIES OF THE GENUS CHRYSOBOTHRIS, WITH A KEY TO THE SPECIES OF HORN'S GROUP IV[1]

(Coleoptera, Buprestidæ)

BY W. J. CHAMBERLIN

Forest Entomologist, Oregon State College

The genus *Chrysobothris* has long been a popular group in the family *Buprestidæ* but of late years the student has had difficulty in correctly identifying much of his material, due to the lack of a suitable key. In the introduction to his Monograph of the species of this genus[2] Dr. Horn states that it is probable that very few new species will be discovered in the group. In his Group IV, with which this paper is concerned, he lists sixteen species. In the nearly fifty years which have elapsed since his paper was published the number of species in Group IV has practically doubled, there being 31 listed in the key here presented. No attempt has been made to publish any extensive treatise on this group, although many descriptions of isolated species have appeared from time to time, and in 1910 Professor Fall published a paper[3] wherein he pointed out the errors in Horn's work, described two new species and gave a key to the eight species falling in the group near *C. californica.* The accumulation of more and more material and the appearance of the descriptions of new species here and there has now made it quite impossible to identify specimens by Horn's key. A new key incorporating the thirteen species described since 1886 and two additional species which are apparently new, is herewith presented and it is hoped that with this key, and the accompanying illustrations, the species of this difficult group may be satisfactorily determined.

It should be borne in mind that there is some variation within the species and that although the figures are, with one exception, reproduced from actual photographs the tibial dilation may not fit the picture exactly. However, by carefully observing the other details little difficulty in identifying the males will be

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[1]Published as Technical Paper No. 198 with the approval of the Director of the Oregon Agricultural Experiment Station. A contribution from the Department of Entomology.

[2]1886, Horn Geo. A Monograph of the Species of the Genus Chrysobothris. Trans. Amer. Ent. Soc., XIII, pp. 65-124.

[3]1910, H. C. Fall. On *Chrysobothris californica* and Allies. N. Y. Ent. Soc., XVIII,. pp. 45-52.

encountered. In the case of females which are not associated with males it is often quite impossible to determine them with certainty.

In making up the key I have had before me representatives of all species except *orono* Frost, and of this Mr. J. N. Knull very kindly sent me a drawing of the tibia. All other species are represented in my own collection, but in order to be able to examine more specimens, some were borrowed and I wish to express my gratitude to Dr. H. E. Burke, Mr. J. N. Knull, Mr. H. C. Fall, Mr. F. S. Carr and Mr. E. K. Gibson for loan of material.

Kerremans' species *C. horni* is based upon a single female which may or may not belong to Group IV. The status of an isolated female cannot be readily determined. The problem is not facilitated by the fact that the type locality is given as simply United States. The same is true of *C. lata* Kerremans,[5] which is supposed to have come from Florida and to be near *dentipes*.

Regarding Horn's Group V.

Dr. Horn's group V with its five species, characterized by subcylindrical, parallel form and with the upper surface slightly pubescent, offered little difficulty at the time of his revision. Since then *pubescens* Fall, *fragariæ* Fisher, *peninsularis* Schaef. have been assigned to the group and it has taken on a rather heterogeneous appearance and no longer can it be characterized as containing species of a subcylindrical form, for certainly *fragaria* and *pubescens* as well as *cyanella* are no more subcylindrical than are such species as *beyeri* Schaef., *bacchari* V. Dyke, *oregona* n. sp. and some specimens of *texana* Lec. Neither is the dorsal surface much more pubescent than we find in several species of Group IV.

The last ventral segment of *fragariæ* in the two specimens I have seen is not serrate. It is interrupted at widely spaced intervals but this cannot be termed serrate.

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[4]1903 Kerremans, Chas., Genera Insectorum, Fasc. 12 Family Buprestidæ, p. 12.

[5]1899 Kerremans Chas., Ann. Soc. Ent. Belg., Vol., 43, p. 336.

Just what should be done with this Group V is a question which might be satisfactorily answered if one had sufficient material. Unfortunately, all the species seem to be quite rare and until we are able to accumulate more material and learn something of their biology they are perhaps best left as they are, although *fragariæ* and *pubescens* could with equal propriety be placed in Group IV.

The following two new species belong to Horn's Group IV:

Chrysobothris canadensis Chamberlin, n. sp.

About the size of *C. californica* with a fascies somewhat as in *dentipes*, especially in the male. Robust, depressed, upper surface dark with faint greenish lustre; head dark above. Front coppery, (female) or greenish, (male) and shining in lower half; two callosities near middle, female with scattered very fine pubescence, male with pubescence more numerous and longer. Clypeus with a broad V-like emargination; antennæ normal, 1st and 3rd segments each more than twice as long as 2nd; 4th to 11th serrate and gradually narrowing. Prothorax twice as wide as long, entire surface with irregular raised areas, closely punctate between, median sulcus scarcely evident. Sides arcuate in male, a little wider at base than apex. In the female the base is considerably wider than the apex which is noticeably constricted, sinuate at middle, less constricted at base. Elytra wider than thorax; humeral angles rounded; sinuate to basal third, separately rounded at apices; first costa raised, smooth, almost unbroken in the apical two-thirds thence broken to the base, second much broken in the male, less so in the female, interspaces quite closely punctate. Beneath dull bronze in both sexes; prosternum not lobed, quite densely punctate and pubescent in male, much less so in female. Last ventral with serrulate margins, male with a deep semi-circular emargination at tip; female with a notch which is as deep as wide, sides parallel, rounded at bottom. Length, male 15, width 6.6 mm. Female, length 17, width 7.5 mm.

Front and middle tibia of the male arcuate, hind tibia straight. The tibial dilation occupies less than one-third the tibial length and is about twice as long as wide, starting from an indentation it widens gradually to the tip, the lamella forming an arc rising in the indentation and terminating just beyond the middle of the dilation.

Described from a series of six specimens, two males and four females, submitted by Mr. F. S. Carr of Medicine Hat, Alberta. Four specimens were taken at Banff, Alberta VII - 19 and VIII - 8.

Two at Waterton, Alberta VII - 17. In addition to the above I have one male collected August 3, 1930, at 8600 feet in the Strawberry Mountains, Grant County, Oregon, which differs but little from the typical series. This species falls in Horn's Group IV near *scabripennis* from which it is easily distinguished by its size.

Type locality Banff, Alberta. Type in author's collection. Paratypes in collection of Mr. Carr and Canadian National Collection in Ottawa.

Chrysobothris oregona Chamberlin, n. sp.

Of the size and general appearance of *C. purpurifrons* but the tibial dilation of the male places it in Group IV, where it falls close to *pusilla*. Dorsal surface bronze, shining. Thorax widest just behind the front; base narrower, closely, densely, punctate; median sulcus evident at middle but not extended to the front or hind margin. Elytra roughened, densely punctate, without raised areas; discal fovæ large shallow; costæ one and two prominent, raised, black and shining in apical three-fourths, scarcely evident in basal fourth. Costa three, evident only in middle third; elytral surface covered with scattered short, white, stiff hairs, their apices separately rounded, the serrations scarcely evident.

Front and antennæ green in male, bronze in female, segments 4 - 11 with dark-tipped lobes, gradually narrowing to apex. Prosternum of the male lobed in front, punctate and covered with long white pubescence; last ventral with serrate margins, with a wide, rather shallow emargination at tip. Front tibia of male arcuate, apex widening gradually without indentation; a lamella rises in an arc which is cut off at the middle; hind tibia nearly straight. Prosternum of the female lobed, less densely punctate and with few hairs, last ventral broadly rounded with a very small indentation at middle, lateral margins serrulate.

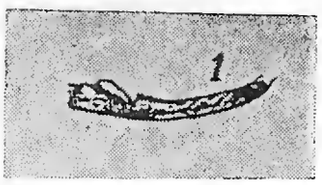
Described from three specimens, two males and a female taken at Bull Prairie, Lake County, Oregon, July 27; elevation 7000 feet. Types in the author's collection. There is no other species in Group IV, lobed division, that resembeles this species.

Key to the Species of Chrysobothris in Horn's Group IV.

	Prosternum lobed in front	1
	Prosternum without lobe in front	15
1.	Tibia of ♂ with a distinct indentation or sinuation just before the dilation	2
	Tibia of ♂ without obvious indentation before the dilation	4

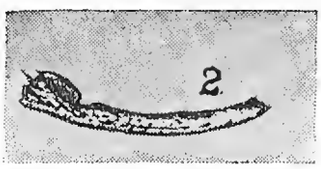
2. Thorax without elevated black smooth areas..... 3

Thorax with elevated black smooth areas.



Dilation of front tibia of ♂ abruptly narrowed one-third before the apex.....*caurina* Horn.

Dilations of front tibia rising from a slight sinuation, thence regularly arcuate to tip, almost as broad as long.....*monticola* Fall.



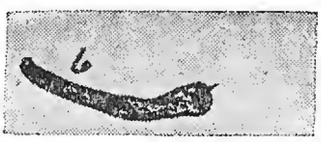
3. Tibial dilations of ♂ widest at tip.....*nixa* Horn.

Tibial dilations of ♂ narrowed at tip.....*texana* Lec.

4. Dilation of front tibia of ♂ widest at or very near the tip 5
Dilations widest in the basal two-thirds..... 8

5. Median sulcus of prothorax well marked; prominent elevated smooth spaces laterally..... 6
Median sulcus practically obsolete and without prominent elevated areas..... 7

6. Femoral tooth long and acute; tibial dilations feeble; legs bronze.....*exesa* Lec.



Femoral tooth rounded; tibial dilation short and abrupt, legs green.....*falli* Van Dyke.

7. Head and pronotum brilliant cupreous; costæ distinct and scarcely interrupted.....*lineatipennis* Van Dyke.

Entire upper surface dull bronze; elytral costæ faintly discernible and considerably broken up.....*mali* Horn.

8. Pronotum without prominent elevated smooth areas..... 9
Pronotum roughened, with elevated smooth areas..... 12

9. Small species five-sixteenths or less;
Eastern states.....*pusilla* L. & G.
Larger species three-eighths or more in length, Western states 10

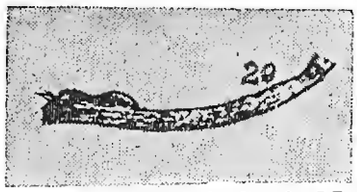
10. Head and antennæ of ♂ green; clypeal emargination broad shallow; tibial dilation short about one-fifth length of tibia.....*oregona* n. sp.
Head and antennæ bronze in both sexes..... 11

11. Tibial dilation nearly one-third of tibial length, widest about the middle thence tapering sharply to the front.....*beyeri* Schaef.
Tibial dilation about one-fourth the length of the tibia, widest behind the middle, thence sinuate and widening slightly at tip.....*bacchari* Van Dyke.

12. Form large, broad; median sulcus of thorax prominent..... 13

Form small, narrow; median sulcus, scarcely evident.....*juniperinus* Chamb.

13. Elytral costæ sinuous; head and thorax metallic, shining.....*blanchardi* Horn.
Costæ interrupted, expanded in broadened smooth areas..... 14

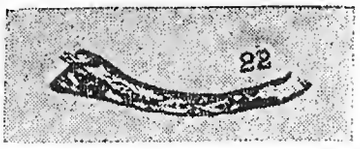


14. Clypeal emarginations of ♂ semicircular; front with numerous raised smooth areas.....*woodgatei* C. & N.

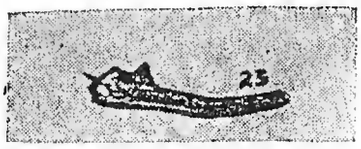
Clypeal emargination broad, shallow, front with four small callosities.....*quadrilineata* Lec.

15. Color above bright shining blue or green.....*harrisi* Hentz.
Color dark bronze to nearly black..... 16

16. Segments 4 to 11 of the antennæ with testaceous lobes..... 17
Segments of antennæ more or less homogeneous throughout, no testaceous lobes..... 18



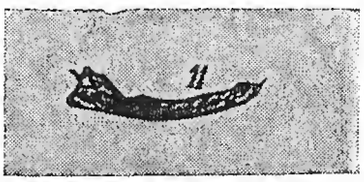
17. Head bronze in both sexes; dilation of the anterior tibia of ♂ gradually broadened to tip.....*dentipes* Germ.



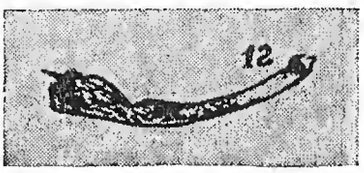
Head greenish (less so in ♀); dilation of the anterior tibia of ♂ abruptly broadened into a tooth-like projection, thence narrowed to tip.....*verdigripennis* Frost.

18. Front tibia of ♂ with a distinct indentation just before apical dilation..... 19
Front tibia of ♂ without indentation before the apical dilation 24

19. Tibial dilation widest behind the tip usually at, or posterior to, the middle..... 21
Tibial dilation widest at or near the tip..... 20



20. Species small, less than one-half inch long; ♂ tibial dilation serrulate.....*scabripennis* Cast.



Species more than one-half inch in length, tibial dilation of ♂ gradually and uniformly broadened from base to near the tip.....*canadensis* n. sp.

21. Antennal segments 4 to 11 of approximately the same width.....*ludificata* Horn.
Antennal segments 4 to 11 gradually narrower..... 22

22. Body beneath bronze in both sexes; tibial dilation of ♂ nearly as broad as long.....*breviloba* Fall.
Body beneath shining green in ♂ and at least some greenish reflections in ♀..... 23

23. Prosternum ♂ not densely punctate; tibial dilation occupies at least one-third the tibiæ length.....*pseudotsugæ* Van D.

Prosternum ♂ densely and finely punctured; tibial dilation occupies approximately one-fourth the tibial length....*laricis* Van Dyke.

24. Disc of thorax not distinctly sulcate; species blue-black above, no metallic luster.....*dolata* Horn.

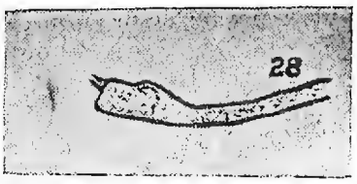
Disc of thorax with evident median sulcus; species with bronze or cupreous reflections above..... 25

25. Tibial dilation narrow, more than one-third as long as tibia; legs purplish bronze; species of large size.....*californica* Lec.

Tibial dilation of ♂ less than one-third as long as tibiæ; species smaller..... 26

26. Prosternum sparsely pubescent and sparsely punctate; tibial dilation of ♂ long and narrow.....*carinipennis* Lec.

Prosternum densely pubescent and densely punctate; tibial dilation nearly as broad as long..... 27



27. Prothorax narrower at apex than at base; color nearly black above; antennal segments 4 to 11 with black lobes.....*orono* Frost.

Prothorax not narrower at apex than base; antennal segments without black lobes..... 28

28. Upper surface with distinct bronze reflections, both sexes bronze beneath, ♀ with slight greenish tinge.....*trinervia* Kby.

Upper surface with dark greenish reflections; beneath bright metallic green in ♂; darker in ♀.....*sylvania* Fall.

A NEW GENUS AND TWO NEW SPECIES OF LEAFHOPPERS FROM CALIFORNIA[1]

(Homoptera Cicadellidæ)

BY R. H. BEAMER

Penehuleria Beamer, new genus

Resembling *Huleria* in size and general appearance but with very long vertex, almost twice as long as width between eyes and with median longitudinal ridge; elytra with two cross-nervures instead of one and five apical cells instead of four. Ocelli on margin of vertex about four times their diameter anterior to eye.

Type of genus *Penehuleria acuticephala* n. sp.

Penehuleria acuticephala Beamer, n. sp.

Resembling *Huleria 4-punctata* Ball but with the vertex long and narrow, usually twice as long as distance between eyes and with distinct external genitalia.

General color dirty brownish buff with disc of vertex and scutellum lighter. Elytra semihyaline with brown of body showing distinctly, veins lighter. Face yellowish white bordered with fuscous line from eye to eye. From ocelli to eye the dark line divides enclosing a small white area, upper portion of fork visible on vertex as a small angular spot.

Structure: Vertex very long and narrow, usually about twice as long as distance between eyes; lateral margins sharp almost foliaceous, straight from ocelli to apex, angle of divergence increasing from ocelli to eye; with mesal longitudinal ridge from apex to base. Pronotum about as wide as eyes, posterior margin deeply sinuate. Elytra longer than abdomen, of about same venation as *H. 4-punctata* Ball except one additional apical cell and two cross nervures instead of one.

Genitalia: Last ventral segment of female slightly longer than preceding, posterior margin almost straight with narrow mesal v-shaped notch. Male valve as long as preceding segment, bluntly angular; plates about same width as valve at base, slightly larger just beyond, then evenly narrowing to sharp apices; almost three times as long as valve. Pygofer drawn out into long slender, dorsally curving black tipped spine, this spine almost as long as the plates.

Holotype ♂, allotype ♀ and 2 ♂ and 11 ♀ paratypes, Mint Canyon, Calif., July 6, 1933, R. H. Beamer.

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[1] Contribution from the Department of Entomology, University of Kansas, Lawrence, Kansas.

Two nymphs apparently belonging to this species were swept from a sorgum like grass. The adults were mostly taken from live oak trees in the same vicinity.

Erythroneura inclita Beamer, n. sp.

Resembling *Erythroneura bilocularis* Van D. but easily separated by absence of any dark coloring on pronotum or scutellum.

Color: General ground color ivory more or less suffused with golden yellow, with brilliant red markings. Vertex with disc mostly red, sometimes divided into two areas by mesal white vitta. Pronotum with disc red, also occasionally divided mesally with white vitta. Scutellum with basal angles golden yellow, margined with red on inner sides connected with red apex. Clavus red except outer two-fifths and oval spot near apex of scutellum. Corium more or less golden yellow on costal margin and apical third, remainder red or red-dotted except white areas opposite basal spot of clavus and an elongated one next apex of clavus. Venter stramineous to yellow. Apex of ovipositor black.

Genitalia: Style with usual type short foot of western species. Oedæagus long, in dorsal view straight, tip hollowed out, flaring: in lateral view roundingly curved at base, shaft heavy at base tapering to slightly dorsally bent tip, with a pair of heavy lateral, closely apressed processes ending about one-third distance from tip. Pygofer with two hooks, the lateral one with heavy base, apical one long and slender heavier than the corresponding one in *E. bilocularis* Van D. which this species closely resembles in form of male genitalia.

Holotype, male, allotype, female and numerous paratypes. San Jacinto Mts., Calif., July 21, 1929, R. H. Beamer.

Note on the Alder Scale

What appears to be the alder scale, *Xylococcus betulæ* Pergande, has recently been taken a number of times by County Agricultural Commissioner, Mr. L. R. Cody, on prune trees in the Santa Clara Valley. So far as I know this is the first record of a scale of this type being found on fruit trees. Its presence is indicated by a slender white thread which protrudes, usually from a crotch in a small branch or at the base of a leaf bud, the female being imbedded in the tissues of the plant. This scale occurs normally on alder and birch in Oregon and California and is common in the Eastern States.—E. O. Essig, University of California.

Proceedings of the Pacific Coast Entomological Society

The One Hundred and Twenty-sixth Meeting

The 126th meeting of the Pacific Coast Entomological Society was held in the rooms of the California State Department of Agriculture, Room 10, Ferry Building, San Francisco, September 12, 1931, at 8 p. m., President Van Dyke in the chair. The following were in attendance: E. C. Van Dyke, E. R. Leach, A. T. McClay, George R. Wilson, Donald Kelly, Robert Usinger, Elwood C. Zimmerman, Theron Davis and Robert Wind, members, and Paul S. Bartholomew, L. A. Mead, Albert Mead, Lawrence Saylor and Howard E. Hinton, visitors.

After reading of the minutes of the previous meeting and of the Treasurer's report, President Van Dyke stated that he had held the office of President for 21 years and it was his wish that some other member should take over the duties of the office for a time. He then appointed G. R. Wilson, A. T. McClay and Donald Kelly a committee to nominate officers for the ensuing year. Dr. Van Dyke then called attention to some interesting captures of Coleoptera during the year, especially of the finding of a pair of an *Amblycheila*, probably *picolominii* Reiche,[1] by Mr. Joseph Slevin at Skidoo in the Argus Mountains, California. Mr. Leach stated that specimens in the U. S. National Museum, determined as *picolominii* by Walter Horn were not like these taken by Mr. Slevin and thought the latter might prove to be new. Dr. Van Dyke then reported the capture by J. A. Kusche of *Cicindela longilabris perviridis* with more than normal extension of the yellow markings, thus resembling *C. laurentia* of Colorado, and the capture by him of *Scaphonotus longiceps* Van Dyke, north of Arcata, California, the second reported taking of this species, a species that exhibits a remarkable adaptation to its habit of feeding on helicid snail shells. He also called attention to the Helmidæ as an interesting family much in need of revision, and noted the following miscellaneous captures: *Glyptoselimorpha marmorata* by Alonzo Davis, *Nanularia cupreofusca* by Mr. Saylor and of *Diphyllostoma linsleyi*.

Donald Kelly and Robert Usinger told of collecting insects at Coffee Creek in Trinity County, and Robert Wind gave an account of his collecting experiences in Wyoming where he found *Euphydryas gilletti* in numbers along Snake River.

Paul Bartholomew reported success in adding to the local list of Aphididæ, Mr. Leach reported on his collecting in Mendocino County, and Mr. Zimmerman and Mr. McClay on their summer's collecting. Mr. Wilson gave an interesting account of his experiences while inspecting shipping, and of some of the difficulties encountered.

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[1] Later determined as *Amblycheila schwarzi* W. Horn.

Mr. Albert Mead and Howard E. Hinton were elected to membership. The nominating committee reported that they had not yet reached a decision but would report at the next meeting.

The One Hnndred and Twenty-seventh Meeting

The 127th meeting of the Pacific Coast Entomological Society was held Saturday, December 5, 1931, at 8 p. m. in the rooms of the California State Department of Agriculture, Room 10, Ferry Building, San Francisco, Dr. E. C. Van Dyke in the chair.

The following were in attendance: E. C. Van Dyke, George F. Ferris, H. E. Burke, E. R. Leach, E. P. Van Duzee, George R. Wilson, E. Gorton Linsley, Michael Doudoroff, J. F. Killeen, Donald Kelly, Robert Usinger, John Steinweden, George R. Struble and E. C. Zimmerman, members, and F. D. Klyver, L. A. Mead, Howard McKenzie and Theron Davis, visitors.

After the reading of the minutes of the previous meeting Dr. Van Dyke opened a discussion on the advisibility of continuing the separate publication of the Proceedings of the Society. On motion of Dr. Burke it was decided to publish the minutes in the Society's journal the Pan-Pacific Entomologist, for a time at least.

Mr. Linsley suggested that as there had been some enquiry concerning Life Membership in the Society that a fee for such membership be established, and on motion of Mr. Steinweden the Chair appointed Messrs. Leach, Steinweden and Linsley a committee to consider such membership and report at the next meeting.

Mr. Lawrence Saylor, Mr. Theron Davis and Mr. Howard McKenzie were elected to membership in the Society.

Mr. Van Duzee then extended an invitation to the Society to hold its meetings in the rooms of the Entomological Department of the California Academy of Sciences, and suggested that the meetings be held on Saturday afternoons instead of at night as at present. It was decided to hold a special meeting at the Academy rooms in the afternoon of January 16, 1932, and to decide later on a permant meeting place.

Professor Ferris then gave an account of his experiences while studying at Cambridge University, England. Following this there was a short discussion as to whether memory persisted from larva to adult live in insects.—J. O. Martin, Secretary.

The One Hundred and Twenty-eighth Meeting

The 128th meeting of the Pacific Coast Entomological Society was held Saturday, February 27, 1932, at 8 p. m. in the new rooms of the California State Department of Agriculture, Agricultural Building, Embarcadero, San Francisco, President Van Dyke in the chair.

The following were in attendance: E. C. Van Dyke, E. P. Van Duzee, E. R. Leach, G. F. Ferris, Donald Kelly, Earl D. Duncan,

Ellwood C. Zimmerman, Graham Heid, F. E. Blaisdell, Mrs. F. E. Blaisdell, George R. Wilson, E. O. Essig and J. O. Martin, members, and Peter Ting and Henry Mosher, visitors.

After reading of the minutes and the Treasurer's report Mr. Leach reported the following ticket selected by the nominating committee: for President Prof. G. F. Ferris, for Vice President Prof. E. O. Essig, for Secretary-Treasurer J. O. Martin. No other nominations being offered these were elected as officers for the coming year.

Mr. Leach moved a vote of thanks and appreciation for the many years of faithful service Dr. Van Dyke had given the Society. The Secretary then read a letter of resignation from Mr. W. D. Reed. After discussion the selection of a place for the annual field meeting was left to Prof. Essig and Dr. Van Dyke. On motion of E. C. Zimmerman the Secretary was directed to furnish credentials from the Society for Dr. Van Dyke to the meeting of the Fifth Entomological Congress to be held at Paris, July 17-23, 1932.

The Chair then appointed Prof. Essig and Mr. Leach as delegates to the meeting of the Affiliation Committee of the Pacific Division of the American Association for the Advancement of Science.

Mr. Van Duzee gave an account of the growth of the insect collections at the California Academy of Sciences. When he took the Curatorship of the Department of Entomology in 1916 the collection contained about 30,000 mounted specimens, it now numbers over 880,000 mounted insects, including 14 complete collections, the latest received of these being the Diptera collection of his brother Millard C. Van Duzee of Buffalo, N. Y. This collection of Diptera contains 196 types and otherwise is of special value to the Academy for the very full representation of eastern species. In addition to the Diptera there are many interesting Hymenoptera and Coleoptera. Mr. Van Duzee further stated that his brother was a specialist in certain families of the Diptera and was still studying these and adding to the collection.

Mr. Wilson described the new quarters of the State Quarantine Office and told of some of the work being done by the Department.

Dr. F. E. Blaisdell gave an interesting account of his experiences in raising larvæ of certain Tenebrionid beetles, Mr. Ting told of his work on the mouth parts of the weevils, and Prof. Ferris spoke of his studies on the Mallophaga and Mr. Klyver of his work on the Chermidæ.

Mr. Duncan related his discovery in the Big Basin Region, California, of a remarkable colony of vespids that evidently had overwintered and, starting in the spring with several queens, had attained the unusual size of two and a half feet by three feet, and was estimated to contain about 30,000 individuals.—J. O. Martin, Secretary.

JULIUS GEORGE GRUNDEL

Julius George Grundel was one of that group of California Entomologists which included such men as J. J. Rivers, L. E. Ricksecker and Charles Fuchs. They belonged to the period immediately following the pioneer period which contained such notable entomologists as P. V. M. Lorquin, Hermann Behr, Henry Edwards and James Behrens. Mr. Grundel was born in 1857 in Frankfort on the Main, Germany, came to America in 1871 with his parents and settled in San Francisco. The elder Grundel was a dealer in pipes and tobacco and an expert carver in ivory, meerchaum and amber. When the son was old enough he joined his father in the business and soon became also an expert ivory carver. The first store was at Kearney and Clay, later moved to Market Street, and after his father's death, the son established a factory at Sacramento and Sansome streets. In 1883 he gave up his business and bought a ranch in the Santa Cruz Mountains, later moving to Oakdale. He died on October 20, 1933, at the home of his stepdaughter, Mrs. C. N. Farmer, in Vallejo. Two brothers, Emil and Otto, of San Francisco, a son, Irving at San Jose, and a daughter, Mrs. Jack Plummer of San Francisco, survive him.

Mr. Grundel was proficient not only as a carver of ivory and meerchaum, but as a budder and grafter in horticulture and as an insect collector. He became interested in collecting insects while a boy in Germany and kept up his interest throughout his life. He wrote little, but devoted much of his leisure time to collecting and studying insects in the field and in building up quite an extensive collection of Lepidoptera. This last was deeded to the California Academy of Sciences in 1906, soon after the great San Francisco fire, which, with several other collections left to that institution at about the same time, furnished the foundation for its present first class collection of Lepidoptera. While Mr. Grundel published but little he aided his brother entomologists in their studies by furnishing both information and specimens, and as a result several species bear his name. He was a charter member of the Pacific Coast Entomological Society and until recent years, quite a regular attendant at its meetings.—Edwin C. Van Dyke.

Vol. X April, 1934 No. 2

THE PAN-PACIFIC ENTOMOLOGIST

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MILLARD CARR VAN DUZEE
1860-1934

The Pan-Pacific Entomologist

Vol. X, No. 2 April, 1934

THE HISTORICAL BACKGROUND OF ENTOMOLOGY IN RELATION TO THE EARLY DEVELOPMENT OF AGRICULTURE IN CALIFORNIA

(*Continued from page 11*)

BY E. O. ESSIG

The Russian Period

The more important facts concerning this period have recently been published by the author in the Quarterly of the California Historical Society[1].

The Intermediate Period.[2] 1837-1848

During the brief period from the completion of secularization of the Missions in 1837 until the discovery of gold in 1848, agricultural development in California was retrograding. In the closing of the Missions the livestock was killed and marketed as hides, horns and tallow. New settlers were arriving and a few were planting trees and breaking new land. Gen. M. J. Vallejo had planted an orchard at the Pueblo Sonoma in 1830 which came into bearing during this period and other orchards are known to have been planted by J. W. Wolfskill in Yolo and Los Angeles counties in 1845. In 1846 additional foreign varieties of peach and pear trees were introduced.[3]

In 1830 it was estimated that there were five hundred foreigners in California. In 1840 there were more than one-thousand in addition to four thousand half-breeds. In 1846 there were two thousand Americans, six thousand of other nationalities, and approximately six thousand half-breeds, exclusive of the Indians.[4]

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[1] Essig, E. O. The Russian settlement at Ross. California Historical Society, Quarterly, vol. 12, no. 3, special pub. no. 7, pp. 3-28, ills. Sept. 1933.

[2] For a general survey of conditions in California during the period see Dana, Richard Henry, Jr., Two years before the mast, (Boston, 1840) (Many later editions).

Robinson, Alfred, Life in California, (New York, 1846) (Several later editions).

Simpson, Sir George, An overland journey round the world during the years 1841 and 1842, (Am. Ed., Philadelphia, 1847), pp. 153-223. Simpson was Governor-in-Chief of the Hudson Bay Company's territories.

Revere, J. W., A tour of duty in California, (New York, 1849) (Includes 1845-1847).

[3] Lelong, B. M., Horticultural history of California, State Board of Hort. of Calif., Ann. Rept., for 1892, pp. 33-49 (1892).

[4] Ewer, W. B., Pacific Rural Press, vol. 10, p. 313 (Nov. 13, 1875).

The most notable agricultural development in California during this period was accomplished by Capt. John Sutter, who claimed all of the Sacramento Valley north of New Helvetia or Fort Sutter, which is the present site of the City of Sacramento, to the Sutter or Marysville Buttes, and, in addition, claimed the former Russian possessions at Bodega Bay, Russian River and Fort Ross by right of purchase. He also claimed portions of San Francisco, all of Benecia, and Brazos del Rio (Rio Vista). A superintendent was maintained at Fort Ross, but little progressive development occurred there. About New Helvetia, however, and in various parts of the great valley to the north, extensive farming operations were carried out. He had several hundred laborers as well as mechanics, cowboys, and others necessary to agricultural pursuits, and soldiers to maintain peace. He had great herds of horses, mules, cattle, and sheep, and produced large crops of wheat and other cereals. Orchards and vineyards were planted in the foothills and he became wealthy. His prosperity was short lived. When gold was discovered in 1848 his workmen deserted him, his livestock either perished for want of care or was stolen, his buildings fell into disrepair, his lands became the prey of squatters and new settlers. In short, he soon lost everything during the turbulent times immediately following the gold rush.

The period preceding the gold rush was of great uncertainty. Order was unknown. Small revolutions were common. Many nations contended for the prize, which, through the energy of a few far sighted men, finally fell to the organization of the Bear Flag Republic in 1846, and subsequent ownership of the United States. No one was greatly interested in agriculture or natural history—politics was the all absorbing subject!

The entomological activities during the early part of this time were centered with the Russians at Fort Ross, so that there is an overlapping here. I think it is worth while to compare the splendid work accomplished by the Russian scientists in America, under adverse conditions, thousands of miles from home, with the efforts of a similar group, the great and rich Hudson Bay Company whose members, although they had a marvellous opportunity, contributed practically nothing in entomology, but they did contribute generously in other biological sciences.

A European traveler, Picolomini, who came overland from the eastern states via Arizona and southern California, visited San Francisco a year or so prior to 1839 and collected a few beetles along the way. He evidently mixed his localities for a cicindelid beetle bearing his name, *Amblycheila picolominii* Reiche, obtained through Dupont is listed from San Francsco,[5] but has so far only been taken in Arizona and New Mexico, and not in California.

Theodore Hartweg collected Coleoptera in Mexico during this period and was at Monterey in 1846-47 according to Fordyce Grinnell.[6] His material, some at least, went to the British Museum and was described by Adam White.[7] The species named for him, *Tylcus hartwegi* (White) (*Clytus, Trichoxys*), was taken at Oajaca, Mexico, and ranges into Arizona. White also described some beetles from California, *Ergates californicus* (White) (*Macrotoma*), and the female as *E. spiculiger* (White), synonyms of *E. spiculatus* Lec.; *Romaleum operarium* (White), a synonyms of *R. hispicorne* (Linn.), questionably reported from the East Indies; *Megacyllene antennatus* (White) (*Clytus*) collected by Capt. Sir. E. Belcher on the West Coast of America, undoubtedly California (and ranges into Arizona), and some others. It does not appear that Hartweg took any of the species now listed from California.

THE PETIOD OF AMERICAN OCCUPATION, 1848

This extended and most important period may be divided into three eras as follows:

I. Era of gold seeking, 1848-1852.
II. Era of grazing and grain culture, 1852-1900.
III. Era of fruit culture, 1875-.

I. ERA OF GOLD SEEKING, 1848-1852

A mad rush followed the discovery of gold by James W. Marshall in 1848. Farms, towns and whole areas were completely deserted for the sake of the precious metal with the result that agriculture was almost entirely neglected. However,

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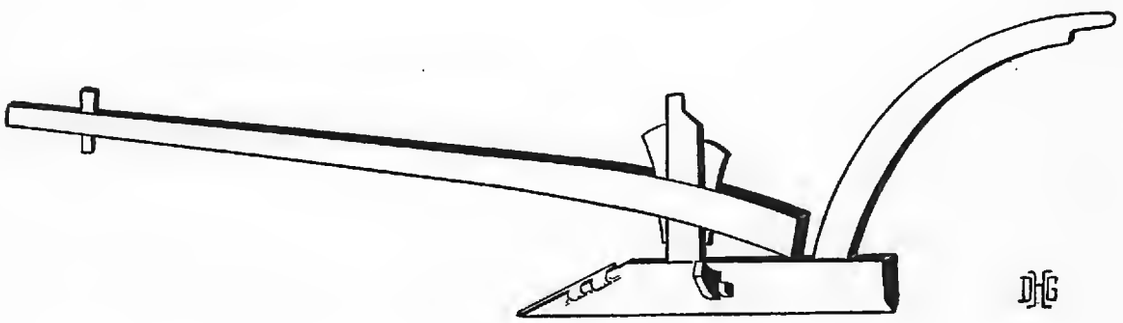
[5] Reiche, L., Ann., Soc. Ent., France, vol. 8, p. 560 (1839).

[6] Bul. Brooklyn Ent. Soc., vol. 9, p. 69 (1914). Perhaps Monterey, Mexico?

[7] Catalogue of longicorn coleopterous insects in the collection of the British Museum, Parts VII and VIII, 409 pp., 10 tabs. (1853-1855).

products of the soil soon became scarce and exorbitant prices were paid for the few that were obtainable. It is stated that in 1848 Peter Weimer, an employee of Sutter under James W. Marshall, who also shared in the discovery of gold, at Coloma, planted some apple seeds from dried fruit imported from the eastern states and in a few years had an apple orchard which yielded him good returns for many years after.[8] In January 1849, Wm. H. Nash planted, in Napa County, an orchard consisting of 36 two-year old seedlings, the seeds of which had been brought from Kentucky. In the fall of the same year he ordered a lot of nursery stock from Rochester, N. Y., which was shipped around the Horn and arrived in the spring of 1850. These were evidently the first trees introduced from outside the state except at the Missions and at Fort Ross. In the latter year he also ordered more trees from Illinois and from Oregon. The peaches on two three-year old trees were sold for $300 in 1850 to a San Francisco merchant who retailed them at one dollar each.[9] Even so progressive a farmer as Mr. Nash used the California plow, which was little better than a forked stick shod with iron and drawn by oxen, until deep plowing was substituted about 1852.



About this time also peaches raised by A. P. Smith sold for from $1.50 to $2.00 each. The first foreign apples to reach the markets in California came from Chile in 1852.

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[8] Lelong, B. M., Horticultural history of California. State Board of Hort. of Calif., Ann. Rept., for 1892, p. 35 (1892).

[9] Menefee, C. A., History and descriptive sketch book of Napa, Sonoma, Lake and Mendocino Counties, (Napa, Calif., 1873), p. 140. Corrections, substituting Rochester, N. Y., for Rochester, Pennsylvania, and Illinois for Massachusetts were evidently made by the author in the copy consulted in the Library of the University of California.

Other fruit trees were brought into California from Oregon in 1853 and were propagated from trees which were composted in a wagon and were kept growing throughout the long journey across the plains, arriving in Oregon in 1848.[10]

In 1850, when California was admitted into the Union as a state, there were 15,000 acres of land under cultivation. The first state agricultural exhibit was held at Sacramento[11] in 1852 and the honey bee was introduced the same year by Professor C. C. Shelton of San Francisco.[12]

In 1858 the grape phylloxera is supposed to have been brought to California on rooted vines, but real evidences of the pest did not appear until 1860[13] and the insect itself was not discovered until 1874.

In 1850 P. J. M. Lorquin, a naturalist from France, began collecting insects in California, having been attracted by the gold rush of that time. He traversed much of the state on foot collecting chiefly Lepidoptera in what was then a virgin field. In 1852-1853 he collected in Sierra, Plumas, Eldorado, Sacramento, San Joaquin, Los Angeles, and San Diego counties in California and at Carson City in Nevada. In 1854-1856 he collected in Sierra, Plumas, Amador, Calaveras, Mariposa, Merced, Madera, Fresno, San Francisco, Marin, and Sonoma counties. His specimens were forwarded to the eminent French entomologist, J. A. Boisduval, who described most of them in 1852.[14] Ninety-five species were taken, of which eighty-three were butterflies and twelve were moths. Fifty-three butterflies and nine moths were described as new species. A few species of Lepidoptera collected by Lorquin at this time fell into the hands of E. Doubleday, H .H. Behr, M. A. Guenée, A. R. Grote and C. T. Robinson.

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[10] Ewer, W. B., History of California agriculture. Pacific Rural Press, vol. 10, p. 313, (Nov. 13, 1875).

[11] Ewer, W. B., op. cit., p. 316.

[12] Ewer, W. B., op. cit., p. 313

[13] Davidson, W. M. and Nougaret, R. L., The grape Phylloxera in California. U. S. Dept. Agr., Bur. Ent., Bul. 903 (Prof. paper), pp. 4-5 (1921).

[14] Lépidopteres de la Californie. Ann. Soc. Ent. France, vol. 21, pp. 275-324 (1852).

II. Era of Grazing and Grain Culture. 1852-1900

After 1851, thousands of immigrants, finding no gold, sought land and became farmers. During this era grazing and grain growing were the leading agricultural pursuits, but vegetable and fruit culture continued to develop. From 1850 to 1860 general agriculture in California increased 9-fold, and from 1860 to 1870 it increased 1½ fold. In 1854 the State Agricultural Society was organized and a fair held at Sacramento. The first agricultural paper, *The California Farmer*, was also founded the same year at San Francisco. In 1855, the wheat yield was 5,833,000 bushels, of which 578,000 bushels were exported.* Barley, oats, Indian corn, rye, buckwheat, beans, peas, and potatoes were also extensively grown and yielded large crops.

"Some rare specimens of vegetables and fruits were exhibited at the State Agricultural Fair of 1856. I saw them myself, and have no doubt as to correctness of the published statements in regard to them. There were exhibited two pumpkins from Sacramento, weighing two hundred and ten, and two hundred and forty pounds. Those were 'some pumpkins', were they not?

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*According to the Rev. William Taylor in California Life Illustrated, (London edition, 1867, p. 251. "—in the year 1856 there were 578,962 acres in California cultivated in cereal grain. Wheat, 176,963 acres, yielding 3,979,032 bushels. Barley, 154,674 acres, yielding 4,639,678 bushels. Oats, 37,602 acres, yielding 1,263,359 bushels. The average yield of wheat for 1856 was twenty-three bushels per acre, which owing to a severe drought of the early part of the season, was much less than of the previous years. The average yield of barley is thirty bushels per acre. It frequently yields from fifty to seventy-five bushels per acre. The average yield of the oat crop is thirty-three bushels per acre. Crops of this grain have frequently averaged seventy-five bushels per acre; and a crop of thirty-two acres in Alameda County, which received a premium at the State Agricultural fair for 1856, averaged one hundred and thirty-four bushels to the acre." In 1856 there were 11,020 acres of Indian corn, "averaging for the entire crop, thirty-one bushels per acre."

According to G. W. Hendry "The period of greatest grain production was from 1866 to 1900. The peak in wheat production occurred in 1886 when 3,000,000 acres were planted and 45,000,000 bushels harvested."

"A beet, grown by Colonel Hall, of Sacramento City, weighing seventy-three pounds;[15] a carrot, weighing ten pounds, measuring one foot and eight inches in circumference, and three feet and three inches in length. There were fifty in the same bed of equal size. The seeds were sown June 25, and the carrots dug September 20. A tomato, seventeen inches in circumference; a squash, weighing one hundred and forty-one pounds; an onion weighing two pounds and fifteen ounces, and measuring twenty inches in circumference; a cornstalk twenty-one feet and nine inches in height," etc.[16] And these figures are given by a minister who was not a Californian! The Rev. Taylor continues: "The soil of California, as proved by successful experiment, is well adapted to the production of cotton, tobacco, sugar-cane, sugar-beet, and mulberry; and it is believed that rice will grow as well on her marsh lands as in China.

"California is also destined to become one of the greatest fruit-growing countries in the world and great attention is being given to the cultivation of the best varieties." In 1856 Taylor gives the following statistics relative to fruit culture:

Apples trees, 325,000; peach trees, 619,000; pear trees, 59-171; cherry trees, 25,264; miscellaneous fruit trees of other kinds, 271,855; and grapevines, 1,531,224. (Taylor p. 256).

Citrus culture in Northern California began after the famous Bidwell's Bar orange tree came into bearing in 1865.** It demonstrated the possibilities of growing oranges in certain localities in the northern part of the State.

Of livestock the following figures for 1856 are given: "horses, 106,991; mules and asses, 30,641; cattle, 684,248;

**The interesting history of this tree is given by E. W. Maslin in a letter received from I. R. Ketchum of Bidwell's Bar, dated July 31, 1888, (State Board of Hort. of Calif., Third Bien. Rept., pp. 38-39, 1888), as follows: "The Bidwell Bar orange tree was raised from the seed of an orange that came from Acapulco, Mexico, by John Morrill, at Sacramento, California, in 1855. (Mr. Morrill's letter to myself in 1866 is enclosed.)

"The tree is fifty inches in circumference six inches above the ground, is twenty-six feet six inches in height, and twenty-four feet, through the branches.

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[15] John S. Hittell reports a mangel-wurzel beet weighing 118 pounds, being 1 foot in diameter by 5 feet long and 3 years old. The Resources of California, (San Francisco, 1875), ed. 6, p. 238.

[16] Rev. William Taylor, op. cit., pp. 253-4.

sheep, 253,312; goats, 4,544; swine, 186,585; poultry, 266,336." (Taylor p. 259).

"The number of grist mills in the state is 135. Thirty-seven mills are propelled by steam, and fifty-four by water. They had a combined capacity of 8,792 barrels a day." (Taylor p. 261-2). In spite of this it is stated that flour was imported until 1862.

In 1873 the wheat crop amounted to 35,000,000 bushels, of which nearly 18,000,000 bushels, or enough to load 550 first class ships of that time, were exported. The total value of all agricultural crops for that year was $17,000,000. In 1875 California became the greatest wheat-producing state in the Union and the second greatest producer of fruits. At that time, 2,700,000 acres were under cultivation. The sugar beet industry was established this same year and the production of wine amounted to 9,000,000 gallons valued at $4,000,000.[17] In this

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"Mr. R. T. Van Norden, now real estate agent at 413 Montgomery Street, San Francisco, purchased the tree of Mr. Morrill in March, 1859, and it came here from Sacramento in a ten-inch tub, was five feet high, and had five branches.

"The tree has been in my care since it was brought here in 1859. It was first set out under a wall by Mr. Howard Burt, in the south side of the office, but was afterwards removed to its present location. Had it been left in the first location, the freshet of January, 1862, would have carried it off, as it did a number of other fruit trees.

"It bore oranges for the first time in 1865; had forty oranges. In 1866 it bore five hundred. In 1882 the crop numbered two thousand two hundred, about seven hundred more than any one year before or since. The regular crop is about eight hundred.

"It is evidently of the Los Angeles variety.

"Some years many of the oranges are very large. Seven years ago two oranges weighed, together, two pounds fourteen ounces. Generally round, some few oblate; skin of all the larger oranges is thick; of the smaller, thin.

"It takes twelve months to fully mature its fruit. The first of December the fruit is a sulphur color. The first of January, an orange color. After fully coloring the fruit increases in size from one fourth to one third.

"I send you a photograph of the tree and bridge, as you have taken an interest in it. Mr. Lelong can get from Mr. Van Norden his account of the origin."

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[17] Ewer, W. B., History of California agriculture. Pacific Rural Press, vol. 10, pp. 313, 316 (Nov. 13, 1875).

year phylloxera was first observed to be a serious pest and recorded in print by Dr. E. W. Hilgard,[18] although its presence had been discovered the previous year. Up to that time the grape growers of California had been observing the effects of this insect on the vineyards of France and its sudden appearance in Sonoma County created intense momentary interest which had to be continuously kindled by Dr. Hilgard and others who were interested in finding methods to limit the spread and to control the pest.

In 1875 the honey bee within the state produced 1,000 tons of honey.[19]

III. ERA OF FRUIT GROWING. 1875.

According to Lelong in 1870 fruit growing became an established and independent pursuit as a result of the completion of the trans-continental railroad in 1869 which gave an outlet to the developing markets in the east and middle west.

In 1871 the production of fresh fruits amounted to 1,823,310 pounds which included the entire output. By 1891 the fresh fruits had increased to 98,680,100 pounds and there were also added dried fruits, 65,090,220 pounds; raisins, 44,954,850 pounds and canned fruits, 49,566,680 pounds. The total acreage of fruits in 1891 was 200,000.

These figures may seem to be a little out of place in a paper of this kind, but I think they are necessary to show both the variety and magnitude of the production and the value of the field crops, fruits, vegetables, livestock and other agricultural resources, which are regularly affected by insect pests. The readjustments of the native insects, the introduction and establishment of foreign pests, the testing and proving of sprays, baits, dusts, and fumigants, and the development of biological control methods are better comprehended when one thinks of the agricultural accomplishments since 1769.

At the present time California produces over one hundred and eighty commercial crops,*** including the following:

***An itemized list of one hundred and seventy-six crops, was compiled by B. H. Crocheron, Director of Extension, Calif. Agr. Expt. Sta., Pacific Rural Press, vol. 110, p. 103 (Aug. 1, 1925).

[18] Pacific Rural Press, vol. 10, p. 275 (Oct. 30, 1875).
[19] Ewer, W. B., op. cit., p. 313.
[20] Lelong, B. M. op. cit., pp. 35-36.

Deciduous fruits	15 kinds	Vegetables	52 kinds
Small fruits	7 kinds	Seeds	32 kinds
Subtropical fruits	17 kinds	Bulbs	7 kinds
Nuts	7 kinds	Ornamentals	8 kinds
Field crops	13 kinds	Miscellaneous	7 kinds
Grains	11 kinds		

According to the Federal State Agricultural statistics compiled by E. E. Kaufman, Statistician,[21] "The acreage of tree fruits, nuts and vineyards of bearing age for the 1926 crop was 1,619,900. For that year the total farm value of the main fruit crops was $215,983,000, which was equivalent to a return of $133.33 per harvested acre. The harvested area devoted to the production of vegetable crops amounted to 315,000 acres and the average return per acre was $182.10 making a total return of $57,360,000. The total value of all main field, fruit and vegetable crops amounted to $432,855,000. The annual production survey of California agriculture for 1926 brings out two outstanding facts when compared with the survey for the previous year. The area harvested that season exceeded the 1925 harvested area by 264,000 acres or 4 per cent, and the value to the grower decreased by $32,586,000 or about 7 per cent."

A Root-Boring Derobrachus

Derobrachus geminatus var. *forreri* Bates has been reported from Santa Rosalia, Baja California, as attacking the roots of olive trees. This makes a third genus from among the *Prioninæ* whose larvæ have been proven to be root borers, the others being *Prionus* and *Stenodontus*.—Edwin C. Van Dyke.

A commercial crop is defined as one produced yearly on an acreage basis. The list omits a number of kinds of flower seeds, roses and other ornamental nursery stock, bearded iris, several subtropical fruits, cacti (forage and fruit), pyrethrum, and a few bush berries. It does not contain cattle, calves, milk, cream, casein, butter, cheese, hogs, goats, sheep, wool, horses, mules, poultry, eggs, and many other items produced on our farms.

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[21] Calif. State Dept. Agr., Monthly Bul., vol. 16, p. 35 (1927).

STUDIES IN THE CERAMBYCIDÆ OF LOWER CALIFORNIA

BY E. GORTON LINSLEY

Oakland, California

The following notes and descriptions are based upon material in the collection of the California Academy of Sciences, mainly from the expedition of the Academy to the Gulf of California in 1921. Several species are recorded from this region for the first time, two of which are described as new. The writer is indebted to Mr. E. P. Van Duzee for the privilege of making this study.

STENODONTES (NOTHOPLEURUS) LOBIGENIS Bates

A long series of the typical form of this species was taken at Puerto Ballandra, Carmen Island, on the Gulf of California, May 22, 1921, by Virgil Owen. Several additional specimens were captured at La Paz, Baja California, on June 4, 1921, by J. C. Chamberlin.

DEROBRACHUS GEMINATUS LeConte

Two specimens, taken on Angel de la Guardia Island, Gulf of California, July 1, 1921. (E. P. Van Duzee.)

EUSTROMULA VALIDUM LeConte

A single example of *E. validum* was found under a stone on Monserrate Island, Gulf of Calif., May 25, (J. C. Chamberlin.)

METHIA BREVIS Fall

A specimen of this recently described longicorn was captured at Angeles Bay, Lower California, June 25, 1921, by E. P. Van Duzee, and very kindly compared with the unique type by Dr. Fall. This is the first Lower California record for the genus *Methia.*

ANOPLODERA INSIGNIS Fall

This rather rare species has always been thought to inhabit only a very small area near Monterey Bay, California. However, on July 15, 1922, Dr. G. D. Hanna and J. R. Slevin found a typical example of *A. insignis* on Guadalupe Island. This distribution is not surprising when one considers that the

Monterey Pine, *Pinus radiata*, in which the species lives, also has the same "spotted" distribution.

Stenosphenus basicornis Linsley, n. sp.

Moderately short, shining, rufous; elytra and abdomen black. Head narrow, coarsely, closely punctured; eyes deeply emarginate, finely granulate; antennæ shorter than the body in both sexes, finely pubescent, ciliated on inner side; scape slender, rufous; second segment slightly longer than broad, rufous; remaining segments piceous, three to seven spinose at apex. Prothorax about as broad as long, wider at base than at apex, sides arcuate; surface smooth, with a few large scattered punctures and erect pale hairs. Scutellum transverse, rounded behind, densely pubescent. Elytra more than three times as long as broad; coarsely, regularly, but not closely punctured, clothed with suberect pale hairs; apices sinuately truncate, the angles dentiform. Legs short, slender, clothed with suberect pale hairs; femora rufous, not clavate; tibiæ piceous at base, black at apex, strongly carinate externally; tarsi piceous. Prosternum of male coarsely, cribrately punctured at sides, with a transverse polished area along apical margin and a shining median longitudinal line from base to apex; prosternum of female less coarsely and more evenly punctured. Abdomen with a few large scattered punctures and suberect hairs; fifth ventral segment of male nearly twice as broad as long and truncate at the apex, in the female only one-half wider than long, narrowed and feebly emarginate at apex. Length 7.3 mm; breadth 2.5 mm.

Holotype male (No. 3845), allotype female (No. 3846, Calif. Acad. Sci. Ent.), and one paratype male, taken on Tiburon Island, Gulf of California, July 5, 1921, by E. P. Van Duzee, on a species of *Prosopis*.

This pretty little species is more closely related to *S. lepidus* Horn than to any other species known to the writer, but is smaller (7-7.3 mm.), with the antennæ shorter than the body in both sexes and the prothorax as long as broad.

Stenosphenus novatus Horn

Taken at Miraflores, Lower Calif., July 29, 1919, (J. R. Slevin).

Stenaspis solitaria Say

One example from Salinas Bay, Carmen Island, June 16, 1921, (J. R. Slevin).

TRAGIDION ANNULATUM LeConte

A typical specimen found on Danzante Island, Gulf of Calif., May 24, 1921, by J. C. Chamberlin.

METALEPTUS FEMORATUS Schaeffer

A specimen taken at San Pedro Bay, Gulf of Calif., July 7, 1921, (E. P. Van Duzee) was very kindly compared by Dr. Fall with examples in his collection from the type locality. This species also occurs at Los Mochis, Sinaloa, Mexico, (C. T. Dodds, collector).

SPHÆNOTHECUS PALLIDUS Schaeffer

A small series of this species was beaten from Palo Verde at Agua Verde, Lower Calif., May 26, 1921, (E. P. Van Duzee). Additional specimens were taken on Tiburon Island, Gulf of Calif., July 4, 1921 and San Jose Island, Gulf of Calif., May 28, 1921, (E. P. Van Duzee).

SPHÆNOTHECUS BIVITTATUS Dupont

Examples of this widely distributed Sonoran insect were taken at Puerto Ballandra, Carmen Island, Gulf of Calif., May 22, 1921, by E. P. Van Duzee.

IPOCHUS FASCIATUS LeConte

Typical examples of *I. fasciatus* were captured on San Martin Island and at San Quentin, Lower, Calif., on June 7-8, 1926, by H. H. Keifer.

MONEILEMA SEMIPUNCTATUM LeConte

Two specimens found by J. R. Slevin at San Pedro, Lower Calif., on July 15, 1919.

MONEILEMA SUBRUGOSUM Bland

Taken at San Pedro, Lower Calif., July 5, 1919, (J. R. Slevin), and Carmen Island, Gulf of Calif., June 16, 1921, (E. P. Van Duzee). The specimens were taken on cholla cactus.

MONEILEMA GIGAS LeConte

Several specimens, rather doubtfully referred to this species, were captured on San Lorenzo Island, Gulf of Calif., June 24, 1921, and San Pedro Bay, Gulf of Calif., July 7, 1921, by E. P. Van Duzee. Also found on cholla cactus.

ACANTHODERES PENINSULARIS Horn

This typical Lower Californian species was taken on San Martin Island, June 8, 1925, by H. H. Keifer.

CŒNOPŒUS PALMERI LeConte

Taken on cholla cactus at San Pedro Bay, Calif., July 7, 1921, by E. P. Van Duzee.

PERITAPNIA NUDICORNIS Bates

One example, San José Island, Gulf of Calif., June 10, 1921, (J. C. Chamberlin).

Adetus vanduzeei Linsley, n. sp.

Elongate, slender, yellowish-brown; densely clothed with a short, appressed, white and tawny pubescense which completely obscures the punctation. Head broad, densely clothed with brownish pubescence, with four white patches on face; eyes small; antennæ attaining the middle of the elytra in the male and the basal third of elytra in the female; scape short, stout, a little more than twice as long as broad, third segment one-third longer than first, fourth about as long as first, fifth and following segments much shorter, diminishing rapidly in length toward apex. Prothorax slightly longer than broad, almost uniformly white except for two tawny basal spots and an irregular smooth discal vitta. Scutellum white, densely pubescent. Elytra two and one-half times as long as broad, sides subparallel; pubescence short, white, dense, with an oval patch of tawny pubescence at sides a little behind the middle, and a subapical tawny spot; apices obliquely truncate. Legs short, brownish variegated with white; first segment of posterior tarsi a little longer than second. Body beneath densely clothed with white pubescence; fifth ventral abdominal segment short and slightly emarginate in the male, excavated before the apex and longitudinally grooved in the female. Length 6.5-9 mm; breadth 2-2.5 mm.

Holotype male (No. 3847), allotype female (No. 3848, Calif. Acad. Sci. Ent.), and three paratypes, reared from *Ibervillea* collected on Ceralbo Island, Gulf of California, June 6, 1921, by E. P. Van Duzee. The specimens emerged in the laboratory in September 1921. It is with sincere pleasure that this fine species is dedicated to Mr. E. P. Van Duzee as a slight tribute for the generous assistance and encouragement that he has given to the writer.

A. vanduzeei is easily known from all other members of the genus by the dense, short, white pubescence, the disposition of the brown areas of the elytra, and the short prothorax.

ATAXIA ARIZONICA Fisher

Two specimens taken at San Nicolas Bay, Gulf of Calif., May 16, 1921, by E. P. Van Duzee.

ESTOLA SORDIDA LeConte

Taken on Cedros Island, Lower Calif., August 4, 1922, by Dr. G. D. Hanna and J. R. Slevin, and on Ildefonso Island, Gulf of Calif., May 17, 1921 by I. M. Johnston.

COLORED LIGHTS FOR MOTHS

BY EDWARD GUEDET

Napa, California

The old time lepidopterists conducted quite a few experiments with colored glasses on the coal oil lamps used for light traps. Professor Rivers was one of those who convinced himself of the attractive powers of red and blue lights where white lights failed to attract.

That his theory has some value, was demonstrated this spring when, with Mr. James E. Cottle of Hayward, California, the writer took a trip to Palm Springs. This delightful town is the center of a good collecting area when there has been some rainfall on the desert. It does not possess lamp posts of any kind and the store windows, lighted with modern lights to attract the attention of promenaders, attract also a variety of moths. It was noted that the modern Neon lights in blue and red colors attracted quantities of Noctuids, Geometers and micros, as well as the common *lineata* and other sphinx moths. The point of interest to us, as we availed ourselves of the material thus brought within easy reach, was that these colored lights would attract, where the white lights, sometimes evenly more favorably located, failed to attract.

For those who are interested in light traps, it seems possible that an arrangement of colored glasses around the light might add to the attractive power of the trap.

A REVISION OF THE GENUS CEPHALOON NEWM.

BY RALPH AND GEORGE R. HOPPING[1]

Dr. Van Dyke[2] in his comments after describing *Cephaloon pacificum*, remarks that the genus should not be split up into weak genera as was done by Col. Casey[3] but suggests that they should be considered as subgenera. Most of the characters of *Cephaloon*, *Sponidium* and *Typitium* given are so variable that, in the opinion of the writers, they cannot even form subgenera.

The few characters they posses hardly suffice to separate the species in order to form an adequate key. *Drachylis* seems to be the exception as the claws are described as not being appendiculate, besides other radical differences.

The keys of Dr. Horn[4] and Col. Casey[3] are not workable as many of the characters used are based on colour or are variable within the species.

Colour, in at least some of the species, is so variable that it can only be used in a restricted sense. Of 67 specimens of *C. tenuicorne* Lec. (*piceum* Horn) taken at Stanley in the type locality of *piceum* the "Cariboo District of British Columbia", 16 are males and 51 are females. The males are all entirely black, with the exception of the legs of a few which are variously bi-coloured. The females vary from entirely black to entirely testaceous (*tenuicorne Lec.*) with every intergrade. Therefore Dr. Horn's use of colour to separate *piceum* Horn from *tenuicorne* Lec. will not hold.

The form of the prothorax is variable in shape in the same species. The margins may be quite evenly rounded or quite angulate in the same species, or the pronotum convex or comparatively flat.

The distance between the eyes has been used as a specific character. This is more or less sexual, the males generally being much narrower between the eyes than the females, but even between individuals of the same sex and species it is somewhat variable.

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[1] Contribution from the Division of Forest Insects, Entomological Branch, Dept. of Agriculture, Ottawa Canada.

[2] Bull. Brook. Ent. Soc., vol. XXIII, 1928, p. 261.

[3] Ent. News, vol. IX, 1898, pp. 193-195.

[4] Coleop. of Baja Calif., Supp. II, 1896, p. 380.

The measured distance between the eyes of the sexes of three of our western species are given below.

Cephaloon bicolor Horn

Males	Females
1. .264 mm.	1, .396
2, .220	2, .484
3. .220	3, .506
4. .242	4, .484
5, .176	5, .462
6, .198	6, .506
7, .220	7, .484
8, .176	8, .440
9, .154	9, .484
10, .220	10, .440
Ave. .209 mm.	Ave. .469 mm.

Cephaloon vandykei n. sp.

Males	Females
1, .220 mm.	1, .594
2, .176	2, .506
3, .242	3, .440
4, .154	4, .550
5, .264	5, .440
6, .220	6, .440
7, .220	7, .528
8, .220	8, .506
9, .220	9, .484
10, .154	10, .484
Ave. 209 mm.	Ave. .497 mm.

Cephaloon pacificum Van D.

Males	Females
1, .264 mm.	1, .330
2, .242	2, .330
3, .220	
Ave. .242 mm.	Ave. .330 mm.

Therefore it may be seen that the use of this character in a key is impossible. Although the emargination of the last ventral segment in our western species is quite distinctive, both between the species and between the sexes, the males have another character of which the only mention is in Colonel Casey's description of *C. versicolor*, male,[5] where he says:

"The posterior margin of the third segment has a small bifurcate process." This bifurcate process is present in the males of all of our western species except *pacificum* Van D., and seems to be indicated faintly in the eastern *C. ungulare* Lec.

The types of *C. piceum* Horn and *C. bicolor* Horn were very kindly examined for us by Mr. Charles Liebeck, with the result that the supposed males of each have not the bifurcated process and therefore are females. Of the latter species, only the type remains in the Horn collection. In most collections, the males are either not recognized or are not present because the females seem greatly to outnumber the males. Of one species before us there are 140 females but only 30 males.

[5] Ann. N. Y. Acad. Sci., IX, 1897, p. 652.

In all the males of the western species, the last ventral is broadly, rather deeply emarginate; in the females the last ventral is usually deeply but much less broadly emarginate. In the group having the broad pulvilli, the apex of the pulvillus may be slightly acute or obtuse according to the side or angle from which it is viewed. These pulvilli are soft structures and are sometimes distorted in the dried insect. However the slender curved pulvilli (fig. 16) of the group containing *C. ungulare* Lec. and *C. pacificum* Van D. are unmistakable.

The combined length of the three distal segments of the antenna forms a reliable character for distinguishing certain of the species as is shown by the following table:

Combined length of the three distal antennal segments.

C. tenuicorne Lec.		*C. vandykei* n. sp.		*C. bicolor* Horn		*C. pacificum* Van D.	
♂	♀	♂	♀	♂	♀	♂	♀
1.21	1.10	1.06	1.23	1.60	1.63	3.34	1.85
1.05	1.10	1.17	1.10	1.45	1.45	3.21	
1.10	1.14	1.17	1.23	1.67	1.47	Ave.	
1.21	1.23	1.23	1.21	1.43	1.54	3.28	
1.32	1.10	1.10	1.28	1.67	1.78		
1.16	1.27	1.19	1.23	1.65	1.65		
1.21	1.10	1.10	1.32	Ave.	1.72		
1.16	1.21	1.19	1.21	1.58	1.76		
1.10	1.21	1.17	1.19		1.47		
1.14	1.27	1.10	1.17		1.43		
Ave.	Ave.	Ave.	Ave.		Ave.		
1.17	1.17	1.15	1.22		1.59		

C. lepturides Newm.		*C. ungulare* Lec.	
♂	♀	♂	♀
1.21	1.08	2.64	2.20
1.03	.92	2.68	2.05
1.10	1.03		1.98
Ave.	Ave.	Ave.	Ave.
1.11	1.01	2.76	2.07

We wish to thank the following for their help: Mr. P. J. Darlington and Mr. Charles Liebeck who kindly compared specimens with the types; Dr. E. C. Van Dyke who loaned material and paratypes of *C. pacificum;* Mr. E. R. Leach, Mr. F. T. Scott, Mr. Chas. Liebeck, who loaned material and Dr. F. E. Blaisdell, who sent his own material and that of the California Academy of Sciences. Mr. H. S. Barber and Mr. L. L. Buchanan also examined material for us.

KEY TO THE SPECIES

A. Pulvilli or appendages of the tarsal claws very slender, acute, and curved at the tip (fig. 16).
  B. Lateral margins of pronotum behind the middle almost straight. Eastern species.....1. *ungulare* Lec.
  BB. Lateral margins of pronotum behind the middle distinctly emarginate. Western species.....2. *pacificum* Van D.

AA. Pulvilli, or appendages of the tarsal claws robust, obtuse, not curved at tip (fig. 17).
  B. Antennæ with terminal joints evidently thickened distally (fig. 10). Eastern species ..3. *lepturides* Newm.
  BB. Antennæ only slightly thickened distally (fig. 13, 14, 15). Western species.
    C. Three distal antennal segments approximately 1.5 mm. (fig. 14). Coastal species.....4. *bicolor* Horn.
    CC. Three distal antennal segments barely over 1 mm. (fig. 13, 15). Interior species.
      D. Bifurcate process of 3rd ventral long and fingerlike (fig. 2); males, colour black.....
      .....5. *tenuicorne* Lec.
      Last ventral shallowly and narrowly emarginate (fig. 6); females, colour black to testaceous.....5. *tenuicorne* Lec.
      DD. Bifurcate process of 3rd ventral shorter, more triangular (fig. 1); males, colour testaceous....
      .....6. *vandykei* n. sp.
      Last ventral deeply emarginate (fig. 5); females, colour, elytra and metasternum black, remainder reddish testaceous.....
      .....6. *vandykei* n. sp.

1. CEPHALOON UNGULARE Lec.

1874, Proc. Bost. Soc. Nat. Hist., vol. XVI, p. 275.

Length male 10-12 mm.; female 12-13 mm. This species is closely related to *C. pacificum* Van D., but differs as in the key, having shorter antennæ in the males and in being somewhat more finely punctate throughout. All of our specimens are testaceous except some with dark areas on the head, pronotum and abdomen.

Type locality, White Mts. and Lake Superior.

Six specimens are before us from New Hampshire, North Carolina, New York. In literature "L. Sup." is given.

2. CEPHALOON PACIFICUM Van D.

1928, Bull. Brookl. Ent. Soc., vol. XXIII, p. 260.

Length male 13-14 mm.; female 15 mm. Easily distinguished from other western species by the slender pulvilli, the elongate terminal joints of the antennæ, and the absence of the bifurcate process on the middle abdominal segment on the male. The males have definite marginal and sutural black vittæ and the head, antennæ and pronotum are mostly black; females mostly testaceous.

Type locality, Forks, Washington.

Five specimens are before us, including a male and female paratype from Washington and three specimens, two males and one female, from British Columbia. In literature California is given.

3. CEPHALOON LEPTURIDES Newm.

1838, Ent. Mag., V, p. 377.

C. lepturoides Hald., 1848, Jl. Acad. Nat. Sci., Phila. (2) p. 95.

C. varians Hald., 1848, Jl. Acad. Nat. Sci., Phila. (2) p. 95.

Length male 9-10 mm.; female 10-14 mm. An Eastern species easily identified by its short antennæe with the three distal segments greatly thickened. The colour varies from testaceous to black.

Type locality, undetermined.

Fourteen specimens are before us from Philadelphia, New Hampshire, Michigan, Ontario, Quebec, Maine. "L. Sup." and "Conn." are given in literature.

4. CEPHALOON BICOLOR Horn.

1896, Col. Baja Calif., Supp. II, Proc. Calif. Acad. Sci., (Ser. 2), VI, p. 381.

Length male 11-12 mm.; female 12-16 mm. The males are either entirely testaceous or with indications of black vittæ margining the elytra and sometimes with a black spot on the pronotal disc. They resemble the males of *C. vandykei*, but may be distinguished by the appreciably longer distal three segments of the antennæ, the more rounded emargination of the last ventral segment, and the more shining appearance. The females vary

from entierly black to entirely testaceous. Specimens with black elytra, but with pronotum and head rufous, are not uncommon. This is a coastal species which apparently does not occur in the interior.

Type locality, Sonoma Co., California.

Eighteen specimens are before us from British Columbia and California.

5. CEPHALOON TENUICORNE Lec.

1874, Proc. Boston Soc. Nat. Hist., vol. XVI, p. 275.

Cephaloon piceum Horn, 1896, Coleop. Baja Calif., Supp. II, Proc. Calif. Acad. Sci. (Ser. 2,) VI, p. 380.

Cephaloon ornatum Csy., 1897, Ann. N. Y. Acad. Sci., IX, p. 652.
Cephaloon versicolor Csy., 1897, Ann. N. Y. Acad. Sci., IX, p. 651.

Length male 11-13 mm.; female 12-17 mm. All the males we have seen are black except a few with bicolored legs. The females vary from entirely black to testaceous with every intergrade, but there are no specimens with black elytra and rufous pronotum.

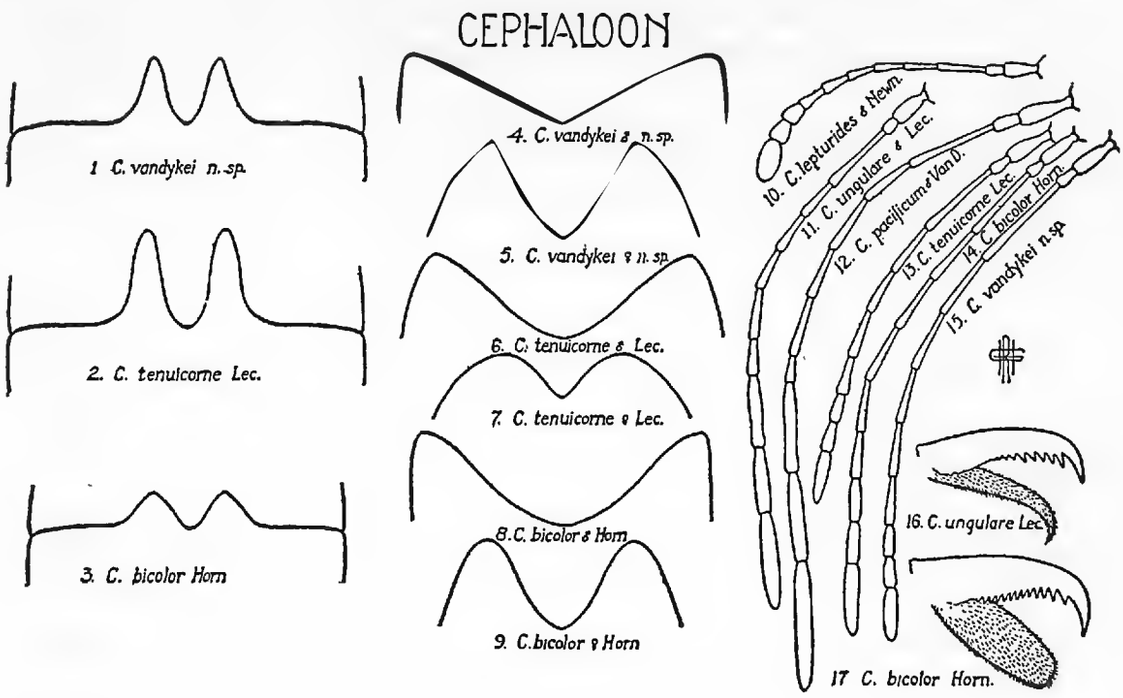
Type locality, Vancouver Island. In all probability this type was collected in the interior of British Columbia as in 1874, specimens from this region were often labelled according to the residence of the sender.

We have examined thirty males and one hundred and forty females from British Columbia, Montana, Idaho, Alberta and Washington. Some other localities mentioned in literature are not reliable, as the species have been greatly mixed in collections.

6. Cephaloon vandykei Hopping, n. sp.

Length male 13.6 mm. Colour testaceous with 4th to 8th antennal segments piceus, head piceus from between the eyes basally leaving spots immediately behind the eyes testaceous and with the ventral surface, except prosternum and part of the head, piceus; front legs testaceous, middle and hind legs bicolored; elytral margins narrowly bordered with black and the suture with basal one fourth and scutellum black.

Head moderately finely punctured, eyes coarsely granulate; pronotum campanulate, finely punctate, as wide at the middle as at the base, lateral margins behind the middle emarginate; elytra wider at the base than the pronotum, sides straight, tapering, to the rounded apices, covered with a fine, moderately long pile, and moderately finely punctate; middle ventral segment with bifurcate



process, the teeth moderately long and acute; claws pectinate, pulvilli robust and obtuse; last ventral broadly emarginate. Length female 15 mm. The female differs from the male only in size and colour with elytra piceus and only the metasternum black; the light coloured portions are more rufous and the last ventral narrowly deeply emarginate.

Holotype, male, No. 3734 in the Canadian National Collection, Placerville, California, May 1932, F. T. Scott.

Allotype, female, No. 3734 in the Canadian National collection, Placerville, California, May 1932, F. T. Scott.

Paratypes in the collections of F. T. Scott, E. R. Leach and California Academy of Sciences, Van Dyke collection, and that of the author, 8 males and 3 females from Placer County, California.

Length male 10-13 mm.; female 12-16 mm. The females of this species have been generally known as *C. bicolor* Horn on account of the black elytra and rufous pronotum which seems to be constant. Horn himself apparently considered this conspecific with his type of *C. bicolor*. The males, which are constantly testaceous above with black vitta margining the elytra, seem to have been generally unknown. They closely resemble the males of *C. bicolor* Horn but may readily be distinguished by the characters given in the key and the bifurcate process as given in the cut (Fig. 3).

A NEW SPECIES OF VECTURA FROM SOUTHERN CALIFORNIA

(Coleoptera: Melyridæ)

BY FRANK E. BLAISDELL, SR.

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In his Coleopterological Notices, VI, 1895, Thos. L. Casey,[1] founded the genus *Vectura* and described two new species. They are characterized by the moderately depressed cuneiform body; small and rather elongate head with the eyes near the base; pronotum more or less constricted just behind the apex and sinuate before the prominent and acute basal angles, base broadly lobed and sinuate laterally at base of the angles; discal submarginal excavated lines present, attaining about apical fourth. Epipleuræ rather wide, flat, subhorizontal, gradually narrow behind the middle and pubescent. Tibiæ devoid of spinules; ungual appendages extremely unequal, the inner long, the outer rudimentary. Integuments more or less densely pubescent, with the hairs appressed to the surface, none erect.

An addition to the genus may be described as follows:

Vectura fulvescens Blaisdell, n. sp.

Form cuneiform, moderately depressed and more or less strongly expanded behind, a little more than twice as long as wide. Color ochreous, head more or less rufo-testaceous; distal segments of the antennæ, last three of the maxillary palpi, metasternum and tarsi nigro-piceous; abdomen black to more or less irregularly piceous. Elytra densely pubescent, less so on the head and pronotum, hairs closely appressed to the surface and fulvous in color. Body beneath less densely pubescent, hairs finer and ashy in color. Punctation fine throughout.

Head triangular before the post-ocular line, moderately elongate when fully extended, widest across the eyes and about four-fifths as wide as the pronotal apex; width on the post-ocular line, one-sixth greater than length from that line to the clypeal apex. Frons plane, slightly and irregularly impressed; lateral margin before the eyes fine and arcuately sinuate within the partly visible antennal insertions. Clypeus transversely oblong, about one-half wider than long, apex truncate, sides scarcely convergent, base arcuate. Labrum noticeably wider than long and quite semi-

[1] Annals N. Y. Acad. Sci., VIII, July, 1895, p. 591.

circularly arcuate at apex. Maxillary palpi moderate in stoutness, terminal segment subconical, two and one-half times as long as wide and equal in length to the third antennal segment; third short and about as wide as long, second obconical and somewhat inflated in apical half. Eyes large, length quite equal to width of clypeal base, facets not coarse and well defined. Tempora not in the least prominent, parallel. Antennæ moderately elongate, about attaining the basal fourth of the pronotum; segments two to five inclusive elongate, second, fourth and fifth obconical, second slightly stouter and equal to the third in length, the latter cylindro-obconical and a little more than twice as long as wide, fourth and fifth shorter and about a half longer than wide; first more robust, distal six segments gradually incrassate.

Pronotum subquadrate, one-fourth wider at basal third than long, apex broadly but not strongly arcuate, slightly reflexed laterally, angles subacutely prominent laterally before the rather strong subapical constriction; sides moderately convergent, broadly but not strongly arcuate between the subapical and subbasal sinuations, margins serrulate; basal angles subacutely prominent, well defined by the lateral and basal sinuations, somewhat reflexed, posterior margin of each arcuate; base about one-fifth wider than apex, broadly and arcuately lobed, almost straight in middle two-fourths, quite sharply sinuate at lateral ninth. Disk moderately convex, submarginal impressed line well marked, rather coarse, slightly incurved at base, its surface and margins irregular, shining, the lateral edge bounded by a slight subacute ridge that curves outward in basal fourth to tip of basal angles; submarginal area more or less impressed, most so at subbasal sinuations; central area less convex before the base, subapical constriction strong laterally, more or less feeble across the disk.

Elytra suboval, widest at apical third, gradually dilated to apical fourth, twice as long as wide across the humeri, not quite three and a third times as long as the pronotum; base broadly emarginate, scutellum subquadrate, humeri broadly and evenly rounded, abruptly precipitous and inflexed laterally; sides gradually divergent and broadly arcuate, less so in apical fourth and more rapidly convergent to the ogival apex, margin very finely serrulate; disk somewhat flat in about basal fifth, noticeably so on the humeri; sides gradually and rapidly decreasing in abruptness of the declivity from the humeri apicad, the surface gradually becoming evenly and less convex from side to side in about apical half; the submarginal area becomes gradually more explanate from beneath the humeri.

Abdomen moderately convex, segments two, three and four quite equal in length; first segment on the medium line about one-fourth longer than the fifth. Legs moderate in length and rather

slender; tarsi elongate and moderately slender. Metafemora attaining middle of fourth abdominal segment.

Male. Narrower, elytra less dilated posteriorly, sides in apical fourth straighter and the apex more ogival. Occipital region of the head more or less piceous; abdomen, metasternum and its parapleuræ dark piceous, metacoxæ pale. Fifth ventral segment truncate at apex. Legs slender.

Female. Elytra more broadly dilated posteriorly, sides in apical fourth more arcuate and the apex less sharply ogival. Metasternum and its parapleuræ dark piceous; abdomen more or less suffused with dark piceous. Fifth segment somewhat deflexed at apex.

Measurements. (Types) Length 3.2-3.5 mm.; width 1.2-1.6 mm.

Holotype, female, No. 3724, and allotype, male, No. 3725, in the author's collection, Museum of the California Academy of Sciences. Collected by Mr. L. J. Muchmore in San Bernardino County, August 19, 1927. Two paratypes in the collection of the Los Angeles Museum.

The differential characters of the three known species can best be presented in a synoptic statement as follows:

Body black; elytra, legs and antennæ towards base, testaceous. Pubescence white, extremely dense, hairs rather long, stout and subsquamiform. Pronotal apical angles rounded, scarcely at all prominent; subapical constriction very broad and subobsolete. Female. S. W. Utah ..... *albicans* Casey

Head and pronotum pale.

Body pale ochreo-testaceous throughout; maxillary palpi and antennæ toward tip nigro-piceous. Pubescence moderately dense, yellowish-white. Pronotal apical angles more or less subacute and prominent. Female, metasternum black. Male, occiput more or less piceous; prosternum at middle clouded with piceous; metasternum and abdomen nigro-piceous. Yuma, Arizona. ..... *longiceps* Casey

Body fulvo-testaceous; maxillary palpi and antennæ toward tip nigropiceous. Pubescence dense and fulvous on upper surface, ashy beneath. Pronotal angles subacute and prominent laterally, subapical constriction strong at sides. Male, occiput somewhat piceous; abdomen, metasternum and its parapleuræ, black; metacoxæ pale. Female, head rufo-testaceous; metasternum and its parapleuræ nigro-piceous; abdomen more or less suffused with nigro-piceous. San Bernardino County, Calif. ..... *fulvescens*, new species

NOTES ON ÆGIALIA WITH DESCRIPTION OF A NEW SPECIES

(Scarabæidæ; Coleoptera)

BY LAWRENCE W. SAYLOR

Berkeley, California

Ægialia (Leptægialia) browni Saylor, n. sp.

Male holotype: Rufous throughout, the elytra darker, faintly shining. Head more than three-fourths as wide as pronotum; clypeus finely and very closely granulate; front punctured, the punctures not coarse, distinct throughout, somewhat confluent near frontal suture; clypeal suture impressed; genæ broadly rounded but distinct. Thorax widest at middle, lateral margins evenly arcuate, in basal half distinctly crenate at hind angles, base strongly margined; disc with large and small punctures intermixed, the small punctures very dense along the anterior margin; the coarse variolate punctures sparser at middle, usually separated by about their own diameters, midway between the middle and sides a group of much denser punctures, sparser at hind angles, very sparse along lateral margins. Elytra with striæ moderately impressed, coarsely punctured, the punctures separated by their own diameters, closer near apex; intervals feebly convex, very finely rather densely punctured; humeri very feebly dentate. Abdomen and metasternum very finely and sparsely punctured, a few coarser punctures near the side-margins. Anterior tibiæ as in *humeralis*, the inner tooth truncate and faintly emarginate. Hind femora extremely finely and sparsely punctured; middle and hind tibiæ slender and more than three times as long as wide; hind spurs moderately stout but parallel and pointed as in *A. montana*. Hind tarsi a little more than three fourths the length of the tibiæ.

Female allotype: Similar to male but inner tooth of front tibiæ narrow and rounded at apex. Side margins of thorax crenulate. There is a good deal of variation in the lateral thoracic margins, which are simple to distinctly crenulate, especially in the female.

Holotype (Calif. Acad. Sci. Ent., No. 3841). Wolverton, Sequoia National Park, California, June, 1929, alt. 7000 to 9000 feet. (E. G. Linsley). *Allotype* same data. Designated *paratypes* will be placed in the collections of the California Academy of Sciences, National Museum, Canadian National Museum, Mr. E. G. Linsley, Mr. H. E. Hinton, and that of the author. Numerous specimens have been examined, many of them collected by Dr. E. C. Van Dyke, who has informed me that they

"were caught at dusk flying near an old decayed log, at 9000 ft. altitude." He thought that possibly the beetles bred in the old decayed woody material of the forest.

I take pleasure in dedicating this species to Mr. W. J. Brown, who has done such fine work on the *Ægialia;* Mr. Brown has very kindly compared all of my material with his types. The facies of this species separate it from all others of the genus which I have examined, as its parallel elongated form superficially relate it to *Atænius.* I have not seen specimens of *A. montana* and *A. humeralis.* The three species, *A. montana, A. humeralis,* and *A. browni,* are very closely related, falling into the subgenus *Leptægialia* Br., but are readily separated by the characters given in the table below, which has been modified from Brown's tables[1]; the other species in the subgenus is included for the sake of comparison:

1. Hind tibiæ three times as long as wide; hind tibial spurs less stout, parallel.....2.
... Hind tibiæ twice as long as wide; hind tibial spurs stout, slightly wider at middle than base; humeri not dentate, Great Lake Region and Western Canada.....*rufescens* Hn.
2. Pronotum with a large area on each side extending from base almost to the anterior angle virtually impunctate; these areas without coarse punctures and with the fine punctures sparse and very indistinct; elytral humeri not dentate. British Columbia and Rocky Mountains.....*montana* Br.
... Pronotum without impunctate areas on the sides, the coarse punctures very sparse near the posterior angles, the fine punctures distinct throughout.....3.
3. Elytral humeri finely but strongly dentate; spurs of posterior tibiæ a trifle more slender. N. E. United States....*humeralis* Br.
... Elytral humeri feebly and very indistinctly dentate; spurs of posterior tibiæ a trifle stouter as in *montana;* anterior tibiæ as in *humeralis.* Southern Sierra Mountains. Calif.....
.....*browni n. sp.*

The southernmost locality for *A. blanchardi* in California has been given by Dr. Van Dyke as Del Norte County.[2] Recently

[1] W. J. Brown, Revision of the N. A. Species of Ægialia, Canadian Entomologist, January, 1931, pgs. 12-15.

[2] E. C. Van Dyke. 'Notes on Scarabædiæ'. Pan-Pacific Ent., Vol. IV, no. 4, pgs. 151-152. April, 1928.

I have collected specimens at Ben Lomond, Santa Cruz County, Calif., May 11, on the sand adjoining a small river. I also have a specimen collected in July at Riverton, El Dorado County, Calif., by Mr. H. E. Hinton; these two records extend the known range several hundred miles southward. I believe a specimen of *A. opaca* Brown (described from British Columbia and Alberta) taken by Mr. Hinton at Tuolumne County, Calif., and by him kindly presented to me, represents a new record for California. I have collected *A. conferta punctata* Br. at Modesto, Calif., in the debris washed up from the irrigation ditches. All the materal mentioned above has been checked by Mr. Brown.

ANOTHER CICINDELA

BY WARWICK BENEDICT

University of Kansas

While collecting last summer in the Guadalupe Mountains of southwestern Texas, I took a small series of a Cicindela new to our fauna, being determined by Dr. Walther Horn of Berlin as *politula lætipennis*, a subspecies described by him from Saltillo, Mexico, some twenty years ago.[1]

Dr. Horn wrote me that of the two examples in his type series, both were blue, one immaculate and the other showing only a broken marginal line from behind the middle to apex with apical lunule and one dot behind the middle of elytron.

The eighteen Texas specimens are blue or blue-green and, with one exception, show no marking other than a very faint marginal line at apex which appears on four or five examples. The one exception has an entire marginal line from base to apex with a short oblique middle band and just a suggestion of the apical lunule.

The beetles did not seem to occur lower than 6000 feet and were found from there up to about 7500 feet, on stones and bare ground of the mountainside, far from water.

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[1] Archiv f. Naturgesch. Vol. 79 A 11 Page 32.

THE GENUS ŒCLIDIUS VAN DUZEE (Homoptera-Fulgoridæ)

BY E. D. BALL

University of Arizona, Tucson

The members of this genus are all very small delicate forms resembling the species of *Œcleus* in the long narrow trough-like vertex, but in this case the trough narrows apically while in that genus the reverse is true. Like that genus the hind tibiæ are unarmed but the nervures are not dotted while in that genus they are. Types in the collection of the author.

Van Duzee established the genus for his *O. nanus* from southern California. Later he described *fraternus* from Mexico and referred his *Brixia fulgida* and *fuscosus* from Jamaica here. Fowler in the Biologia described *Œcleus tenellus* from Guerrero which undoubtedly belongs to this genus. *O. fraternus* has recently been taken in Arizona and Utah. Four new species belonging to the genus have been taken in Arizona and are here described. The six species belonging to our fauna are easily separated by the following key.

A. Three definite carinæ on the mesonotum.
  B. Small (less than 3.5 mm.) pale tawny, no spot on stigma.
    C. Four apical cells, including nodal, in a row along costa. .....1. *nanus* Van D.
    CC. Three apical cells, including nodal, in a row along costa. .....2. *brickellus* Ball
  BB. Large (over 3.5 mm.) with a dark spot on stigma..... .....3. *fraternus* Van D.
AA. Only one carina on mesonotum.
  D. A transverse black band across the anteapicals..... .....4. *transversus* Ball
  DD. Bands reduced to a spot on stigma.
    E. Five anteapicals, the inner two reduced....5. *carolus* Ball
    EE. Three anteapicals.....6. *nimbus Ball*

Œclidius brickellus Ball, n. sp.

Resembling *nanus* Van D. but with only three apical cells in a row with the nodal instead of four. Length 3-3.5 mm.

Vertex very slightly wider than in *nanus*, the face in profile more inflated with a definite angle between vertex and front instead of rounding over above and sloping uniformly throughout. Pronotum longer than in *nanus*. The mesonotum definitely tricarinate as in *fraternus* and *nanus*, elytra as in *nanus*, the apical

nervure from the outer anteapical cells only forking once and thus forming two cells behind the nodal, instead of forking twice and thus forming four cells in a row including the nodal. Male plates broad at the base then narrowed and twisted like a crooked finger instead of narrow at base then gradually widening to an abrupt oval tip as in *nanus*. The lateral projections from the anal ring large and foliaceous instead of blunt or slightly hooked.

Color: pale tawny, the carinæ and margins lighter, often brown shading appears along the margins of the carinæ. Elytra hyaline, nervures and especially the cross nervures and apical portions tawny.

Holotype, female, allotype, male, and two paratypes, Tucson, April 12, 1930; twelve paratypes Tucson March 22, 1931, May 5, 1929; Patagonia Sept. 7, 1929 and Payson Aug. 3, 1929, all collected from the mountains of Arizona by the author.

The writer has collected the above species from Logan and Soldier Summit, Utah, south through southeastern Nevada and northern Arizona to the Mexican border in Arizona, while *nanus* has been taken at many points in southern California to the border. *O. fraternus* Van D., described from the Gulf of California, has been taken at St. George, Utah, by E. W. Davis, from the Santa Cruz River, the Baboquivari Mountains and Yuma, Arizona, and Altar, Mexico, by the writer. It is much larger and of a darker shade.

Œclidius transversus Ball, n. sp.

Resembling *tenellus* but smaller and more definitely marked. Black with the carinæ light, the claval areas smoky, corium hyaline with a broad band across the anteapicals. Length ♂ 4 mm.

Vertex broader than in *nanus*, almost parallel margined to the middle then narrower to the apex, rather than narrowing all the way as in that species Margins of front more foliaceous but ending abruptly on the clypeal margin; the head in profile much deeper and more nearly truncate in consequence. Venation of the pattern of *nanus* but with less forking of the apical nervures. forming only six, relatively large, apical cells. Male plates (ivory white) finger-like bent upward at a right angle, slightly divergent and almost reaching the anal collar.

Color: Body dark smoky brown, the carinæ of vertex and front broadly white; a broad black band across the side of the head below the ocelli. A narrow black band just above the lower white band on front is continued across the genæ, the outer part of the pronotum and the alulets. Median and circular carinæ of pro-

notum white, the median carina and the oblique margins of the mesonotum ivory. Elytra hyaline, the claval areas brown; a broad smoky brown band covers the nodal cells and extends across the anteapicals to the apex of clavus. There is an ivory spot in the anterior angle of the nodel and a hyaline one inside this. The two attingent anal veins darkened.

Holotype, male, and two paratype males, taken by the writer at the High Tanks, "Tinajas Altas", Arizona, May 17, 1932.

Œclidius carolus Ball, n. sp.

Resembling *transversus*, less heavily marked, with the two inner anteapical cells very small, and eight apicals. Length 4 mm.

Vertex much broader at the base than in *transversus* resembling *nanus*, the carinate margins of vertex and front, especially the latter, not so foliaceous. Head as seen from side acutely angled, with the apex rounding instead of almost vertical as in *transversus*. Venation resembling *nanus* except that the two inner anteapicals are reduced and shifted anteriorly, the apical nervures forked, forming eight apicals. Male plates broader and shorter than in *transversus* the anal collar much reduced and distinct.

Color: Body black, the carinæ of vertex and the front white except for the broad transverse band below ocelli; the genæ alternately banded in black and white. Median carina and lateral margins of pronotum and scutellum ivory. Elytra hyaline, nervures brown, scutellar margin narrowly ivory, sutural margin alternating ivory and smoky; a triangular black spot in nodal cell omitting the ivory nervure and one oval hyaline spot in front, the transverse nervures heavily embrowned and usually a brown cloud on the basal portion of clavus.

Holotype, female, allotype, male, and one female paratype taken by the writer at Coolidge Dam, Arizona, May 18, 1930, and one male paratype taken at Wickenberg, Arizona, Aug. 21, 1929. Strikingly distinct by the venation alone.

Œclidius nimbus Ball, n. sp.

Resembling *carolus* but less definitely marked, with a longer vertex and only three anteapicals. Length 3.5-4 mm.

Vertex even wider at base than in *carolus* and much longer, produced in front of eyes and meeting front in almost a right angle. Face as seen from side retreating, the lower portion of the foliaceous carinæ auricularly expanded. Venation reduced, only three anteapicals, the two inner ones wanting, the outer one egg-shaped, acute posteriorly; apical nervures forking, forming nine apical cells.

Color: Black above and below, the elytra hyaline, carinæ on vertex and pronotum narrowly light, face and genæ black. Foliaceous carinæ of front with three pairs of light spots about equally spaced, the largest below. Mesonotum black with the median carina and the outer part of the oblique margins orange. Elytra hyaline, the margins pale, the sutural margin with three black dashes. Nervures pale brown, the transverse ones darker. Anterior half of the nodal cell black; two thirds of the anterior marginal nervure ivory, just inside of which there is a small triangular hyaline area within the black area.

Holotype, female, allotype, male, and four paratypes, May 15, 1933, and eight paratypes June 21, 1930, all taken at Tucson, Arizona, by the writer. Strikingly distinct by the three instead of the usual five anteapicals.

A NEW SPECIES OF SYMPYCNUS FROM MEXICO

BY M. C. VAN DUZEE
Buffalo, N. Y.

Sympycnus dampfi Van Duzee, n. sp.

Male: Length 2.4-2.8 mm. Face long, very narrow, linear, except at upper and lower ends, where it is a little wider; white pollinose; palpi narrow, its pollen and hair white; front black; antennæ (Fig. 5) with first two joints yellow, third brown, longer than wide, rounded at tip, arista basal, as long as middle basitarsi; lower orbital cilia white.

Dorsum of thorax dark blue-green, with rather thick brown pollen, and with a somewhat indistinct brown line in which the acrostichal bristles are inserted; these are few but rather long. Five dorsocentrals in each row; pleuræ black. Abdomen (Fig. 1) with first three segments yellow on the sides, but sometimes first segment is largely black and second and third segments may have the yellow of the sides extended broadly over the dorsum; hairs of abdomen yellowish, but appearing black in certain lights; hypopygium conspicuous, black, its lamellæ elongate-oval, black, with a few small hairs at tip.

All coxæ yellow, anterior pair with a few minute yellow hairs on the front surface; posterior pair with one yellowish bristle on outer side; front and middle femora and tibiæ a pale yellow; hind femora yellow with apical third black above; hind tibiæ yellowish brown, sometimes wholly brown; front legs (fig. 2) with their hairs mostly white, especially those of the tarsi, femora narrowed and bent on apical third or more, with several long black hairs below on apical third; front tibiæ a little arched, concave below, with a row of nearly erect, black, spine-like hairs below; middle

leg (fig. 3), femora with a few black hairs below, tibiæ narrow at base, widening a little below, widest at basal third, where there are a few bristle-like hairs above, also two longer bristles above, one near basal fourth and the other near the middle; hind tibiæ with stiff, black bristle-like hairs below, which are hooked at tip on basal part, running into straight bristle-like hairs apically, and with two bristles at tip; all tarsi plain; length of front tibiæ as 40, of middle as 63, and of posterior as 98; fore tibiæ with curved bristles below, some of which are longer than width of tibiæ at widest part; fore tarsi below (fig. 6) with two small bristles on apical half, their joints as 26-18-10-5-6; of middle pair 40-20-11-8-8; of posterior pair as 20-31-15-10-8. Calypters and halteres yellow, cilia of former yellow, the hairs somewhat brown at base.

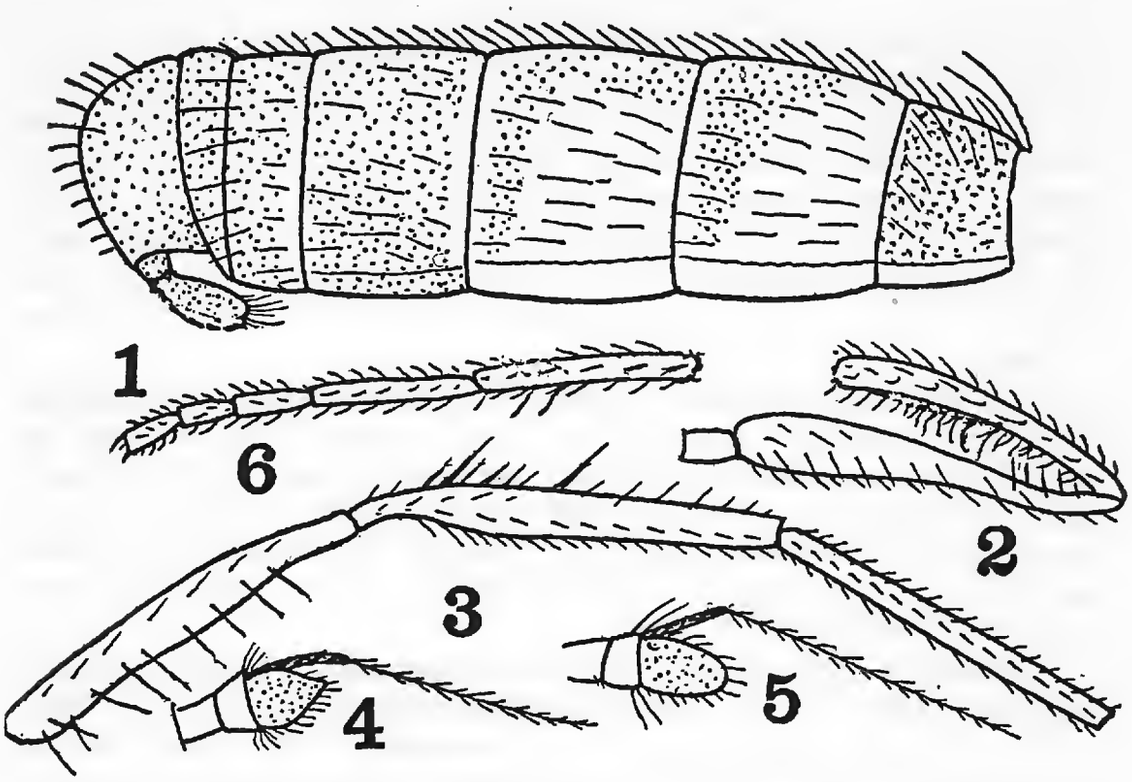
Wings grayish hyaline; third and fourth veins nearly parallel, both bent backward toward tips, third a very little recurved at tip, fourth very slightly bent at basal third, ending in the apex of the wing; last section of fifth vein straight, its length as 33, cross-vein at a right angle with fourth, its length as 15; anal angle of wing gradually rounded off, so as to make the wing somewhat narrowed at root.

Female: Color, wing venation and face about as in the male; antennæ (fig. 4) with third joint triangular, as long as wide, pointed at tip; abdomen with first segment wholly black; second with apical third black; third yellow with apical half black, its hair long, stiff, and almost wholly black; hair on legs wholly black, or nearly so; middle tibiæ with two bristles above.

Described from many males and females, all taken by Dr. A. Dampf, March 5, 1933, at Convento del Desierto, State of Mexico. He found them sheltered in the interior of a small masonry work over a shallow well, which was full of mud and old leaves; so great were the numbers that he took 18,800 with a few sweeps of his net.

Among the species of North America, including Mexico, *dampfi* would run to *inæqualis* Van Duzee, taken at Clear Lake, California. That species has all tibiæ plain, while this has both front and middle tibiæ distinctly enlarged; widest at apical third, the fore tibiæ with curved bristles below on whole length, but the longest just beyond the middle; hind tibiæ with a row of long bristle-like hairs, with bent tips, below on whole length; *inæqualis* has the third antennal joint triangular, pointed at tip, while *dampfi* has this joint broadly rounded at tip, and the hypopygial lamellæ in *dampfi* are elongate-oval, black, and a little clavate.

Among South American species it comes nearest *pallidicornis* Van Duzee, from which it differs in the form of third antennal joint as above, and that species has the hypopygial lamellæ yellow, and of different form.



Explanation of figures of *Sympycnus dampfi* new species.

Fig. 1, Abdomen of male; Fig. 2, front femora and tibia; Fig. 3, middle femora, tibiæ and basitarsus of male; Fig. 4, antenna of female; Fig. 5, antenna of male; Fig. 6, front tarsi of male.

ANDRENA (ANCYLANDRENA) HETERODOXA CKLL., 1930

Mr. Timberlake points out to me that the name of this Californian species is preoccupied by *A. heterodoxa* Perez, 1903. I was quite well aware of the latter species, which occurs in Sicily, but unaccountably forgot it when naming the Californian species, which may now take the name Andrena atoposoma n. n. —T. D. A. Cockerell.

TAXONOMIC NOTES ON SOME COLORADO ASILIDÆ

BY MAURICE T. JAMES

University of Colorado

HODOPHYLAX ARIDUS James

Am. Mus. Nov., 596: 1-2, 1933.

Since the publication of the original description of this species, additional specimens, including several males, have been furnished me by Dr. R. H. Painter. The following remarks and description are based on this series.

There is some variation in the females, particularly in the extent of the pollinose markings of the abdomen. The sixth segment is usually wholly shining, except laterally, the segments beyond the sixth are shining and included in the short, stubby ovipositor. The anal cell is variable, it may be closed and short petiolate, closed in the margin or very narrowly open. The proboscis is short and moderately thick. The first abdominal segment is very short.

Male. Similar to the female, but on an average slightly smaller. It differs from the female only in the abdominal markings and in sexual characters. First abdominal segment wholly shining; second shining, except laterally; third and fourth shining on the anterior half, except for the lateral margins and a median semi-circular marking; posterior half of these segments pollinose except for a median shining spot; on segment three this spot connects with the shining region of the basal half, so that on this segment the semi-circular pollinose marking is isolated. Segments five and six wholly pollinose, their anterior margins narrowly shining, except laterally; segments beyond the sixth withdrawn under the sixth; genitalia small and inconspicuous. One rubbed specimen indicates that the abdominal regions, covered with pollen, are reddish in ground color, not black, as on the naturally shining areas.

Allotype, male, Boone, Colo., 5000 ft., Aug. 17, 1928. (R. H. Painter).

Also described from two other males and eight females, same data as allotype, and one male and one female, Hamilton County, Kansas, 4000 ft., Aug. 6, 1928 (Painter).

Perhaps the relationship of *Hodophylax* is closer to *Parataracticus* Cole than to *Ablautus* Loew. In both *Parataracticus* and *Hodophylax* the anterior tibiæ terminate in a slender spine; in the latter, this spine is moderately long and crooked. This char-

acter was not mentioned in the original description because it was present on only one tibia, and was considered an abnormality. The antennal structure more nearly suggests *Ablautus*. The three nearctic genera of Dasypogoninæ which lack pulvilli may be separated as follows:

1. Mystax confined to the oral margin.....*Hodophylax* James
2. Mystax extending upward upon the face.....2
... Antennal style wanting; anterior tibiæ ending in a thick, claw-like spur.....*Parataracticus* Cole
... Antennæ with a distinct style; anterior tibiæ without a terminal spur.....*Ablautus* Loew

In one female specimen, a part of the pupal case has remained clinging to the head. This indicates the usual median thorns and the "lateral processes" of Malloch, which bear three thorns each, the lowest one fully as large as the other two.

Erax affinis Bellardi

One female, Lake Creek, Colo., July 5, 1932 (Lou Davis), and one female, Gateway, Colo., July 20, 1932 (Davis).

The above specimens agree perfectly with Hine's redescription of this species, which Bellardi described from Mexico. I know of no previous record from the United States.

Stichopogon trifasciatus Say

Neopogon snowii Bezzi, from Wallace County, Kansas, is probably a synonym. Bezzi distinguishes his species from *trifasciatus* by the brownish color of the abdomen, the complete band on the fourth abdominal segment, and the white thoracic bristles. I have not seen the type of *snowii* but I have examined the specimen which Bezzi mentions in the Snow Entomological Collection ("in collectione C. F. Snow, Universitatis Kansensis, in urbe Lawrence, sub nomine *trifasciati* Say, species haec certe latet"), and it is identical with specimens which I have collected in eastern Colorado and western Kansas. There is not a single one of Bezzi's diagnostic characters which is not subject to considerable variation, as indicated by a series of a hundred or more specimens from this region.

Heteropogon wilcoxi James, n. sp.

Male. Head, thorax, and abdomen, except appendages and genitalia, wholly black in ground color, but wholly obscured by a grayish pollen, and wholly clothed with white bristles and pile.

Antennæ slender, black; first and second segments subequal in length; style slender, one-half to two-thirds the length of the third segment. Proboscis black. Mystax bushy, silky above, but consisting of stiff bristles just above the oral margin. Pile of cheeks bushy and silky. Dorsum of thorax, in addition to the usual grayish pollen, with patches of yellow pollen, the bristles and more conspicuous pile confined largely to the yellow-pollinose areas; there are three longitudinal stripes devoid of this yellow pollen, a median line, bisected anteriorly, which extends from the pronotum to the base of the scutellum, and two shorter lateral ones; these are confluent at the suture. In some specimens, particularly rubbed ones, these areas are indistinct. Mesonotum behind the suture with 15 to 20 bristles on each side, mostly lateral, a few median, and several strong bristles on each side before the suture. Scutellum with 3 to 4 pairs of marginal bristles and two tufts of pile, one on each side of the apex; disc pilose or bare. Pleura with conspicuous tufts of pile on the propleura, mesopleura, and sternopleura; trichostical pile and that on the sterna and coxæ bushy and abundant. Femora black, white-pilose; middle and hind femora with a row of white bristles on the inner surface; tibiæ red; tarsi chiefly red, somewhat darkened apically; tibiæ and tarsi with white pile and bristles except for some short, stubby black bristles on the under side of the tarsi, and a conspicuous brush of black bristles on the second fourth of the middle tibiæ; the middle femora may bear a few black hairs opposite to these brushes; anterior tarsi clothed uniformly with silvery pile. Wings hyaline, veins yellow, the anal cell narrowly open. Abdomen with bushy pile laterally, longest on the anterior segments, otherwise clothed only with short, inconspicuous pile; pile of venter longer and more conspicuous. Genitalia largely red, of moderate size, white pilose and shining. Length, 15 to 16 mm.

Female. Similar to the male. Ovipositor black; the black brush on the middle tibiæ and the black hairs on the middle femora wanting.

Holotype, male, taken near Model, north-east of Hochne, Colorado, August 8, 1933 (H. G. Rodeck and M. T. James), in the collection of the University of Colorado.

Allotopotype, female, same data.

Paratopotypes, twelve males, fifteen females, same data.

Paratypes, one male, two females, Mesa de Maya, south of Tobe, Colorado, August 4, 1933 (Rodeck and James); ten females, four males, 35 miles north of Springer, N. M., June 28, 1931 (Don Prentiss and H. A. Scullen); one male, Joliet, Ill., July 4, 1916; three males, two females, no data, probably Colorado.

This species is quite distinct, and may easily be recognized by the uniformly white vestiture of the entire body, the black ground color and the hyaline wings. It is named in honor of Mr. Joseph Wilcox, who had described the species in manuscript, and who, upon receiving paratypes from me, waived the privilege of publishing his description.

The members of the topotype series were taken resting near the dead tips of shrubs in a watchful attitude. One of the undated male paratypes is pinned with a cicada, evidently its prey.

THREE NEW SPECIES OF MOTHS FROM ALASKA

(Lepidoptera, Phalænidæ)

BY FOSTER H. BENJAMIN

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The types of two of the new species described below are from a series of Alaskan specimens donated by Mr. F. W. Morand through Mr. August Busck; the type of the other species has long remained undescribed in the collection of the U. S. National Museum.

Archanarta acræa, Benjamin, n. sp.

Eye small and reniform shaped, strongly lashed, slightly hairy. Male antenna simple and ciliated. Fore tibia unspined.

Head, collar, thorax, and abdomen with a mixed black and white vestiture. Fore wing bluish white powdered with black; basal line black, indistinct, excurved from costa to submedian interspace, thence obliquely excurved to the inner margin; transverse anterior line strong, black, nearly erect from the costa through the cell, excurved in the submedian region, inwardly pointed on vein 1, thence excurved to the inner margin; claviform not defined but fused with the transverse anterior line and forming a slight thickening; orbicular and reniform poorly defined pale blotches; transverse posterior line black, obliquely excurved from the costa, bent inwardly to a point touching the reniform, outwardly oblique and produced to a w-mark on veins 3 and 4, incurved to the inner margin but interrupted by small pointed extensions on veins 2 and 1; subterminal line obsolescent, inwardly defined by a powdery black shading which forms two obscure w-marks, one subapical and one on veins 3 and 4; terminal line black, broken into a series of bars by white dots on the veins; fringe

checkered black and white. Hind wing sordid white, powdered with some black which forms a discal dot, a suffused median shade, and a terminal line, besides somewhat marking the veins and slightly suffusing the inner and outer margins; fringe sordid with only an indication of an interline. Beneath sordid white with some blackish powdering; discal dots faint; transverse posterior line of fore wing and median shade of hind wing indicated as a common shading; terminal lines and fringes as on upper side. Expanse, 23 mm.

Superficially similar to the other three species belonging in the genus, differing from two of these, *quieta* Hübner and *constricta* Walker, by the lack of spines on the fore tibia and the simple ciliated antenna. Agreeing with the third species, *bryanti* Benjamin, on these characters but differing by the distinct and contrasting maculation on the paler ground.

Genitalia: Similar in pattern to those of the other species belonging in the genus, but differing from all known species by possessing a narrower uncus and tegumen.

Type locality: Stony Creek, McKinley National Park, Alaska.

Holotype, male, unique, F. W. Morand, collector, Cat. No. 49740, U.S.N.M.

Epipsiliamorpha æquæva Benjamin, n. sp.

Similar to *E. alaskæ* Grote, and superficially appearing to be a suffused specimen of that species.

Male antenna heavily serrate, the shaft somewhat smaller in diameter than that of *alaskæ*, the serrations somewhat shorter.

Fore wing violaceous gray marked by black, the medial and terminal areas disconcolorously rufous brown; ordinary lines and markings like those of *alaskæ* except that the transverse posterior line closely approximates the distal margin of the reniform, the black markings mesad of the claviform are larger, and the claviform is reduced to an inconspicuous luteous dot followed by fuscous powdering. Hind wing as in *alaskæ* but with more fuscous powdering on the white disc, the distal portion blackish but not defined as a black band and possessing a well marked series of black terminal dots. Beneath, creamy white with some of the maculation of the upper side showing through. Expanse 28 mm.

Genitalia: Essentially as in *alaskæ;* the clasper somewhat shorter; ædœagus about one third longer, the penis with the spinose areas much reduced.

Type locality: Goodnews River, Alaska.

Holotype, male, "Aug", Cat. No. 44752, U.S.N.M.

Pachnobia morandi Benjamin, n. sp.

Eye almost reniform shaped, lashed, slightly hairy. Male antenna strongly serrate and fasciculate, nearly pectinate.

Head, collar, thorax, and fore wing mixed dull rufous and gray. Basal line and claviform obsolete; transverse anterior line dull fuscous, irregular, outwardly oblique from costa to submedian fold, thence nearly erect to inner margin; orbicular and reniform poorly defined, the former as a large rounded rufous blotch, the latter as a rufous blotch, somewhat kidney shaped, and bearing an obscure fuscous central crescent; transverse posterior line dull fuscous, produced to points on the veins, excurved around the cell, incurved below vein 4; subterminal line indicated by the contrast between the darker subterminal and paler terminal shades; fringe practically concolorous with the dull sordid terminal area. Hind wing almost uniformly suffused with dull fuscous; discal mark inconspicuously darker; fringe paler, luteous, interlined with fuscous. Beneath, dull luteous, suffused and speckled with fuscous, with a dull fucous common line, the hind wing with a strong black discal mark. Expanse, 32-34 mm.

Genitalia with the general pattern and habitus of those of *okakensis* Packard, differing mainly by having the uncus evenly tapered instead of spear-shaped, and by having the clasper shorter and heavier; the ædœagi of the two species very similar, that of *okakensis* being somewhat the longer.

Type locality: McKinley National Park, Alaska.

Number and sexes of types: Holotype male, one male paratype, F. W. Morand, collector, Cat. No. 44753, U.S.N.M.

Note on Rothschildia

While my manuscript[1] was in the hands of the printer; Vogler, 1933, Ent. Zeitschr., "XXXXVII," (15), p. 121, ff. 4-5 and p. 122, figured and discussed, under the name "*Rothschildia lebeauina rectilineata* Burmier" (recte *Rothschildia lebeau rectilineata* Bouvier), specimens which certainly seem superficially indistinguishable from those of *R. forbesi*. I am inclined to think that the locality, "Peru," based on specimens which emerged in Germany from cocoons furnished by Steeg, is erroneous. The true *rectilineata*, like *lebeau*, is a form with the hind wing conspicuously broad so that the outer margin is much more nearly parallel with the inner margin than in specimens of the Texan species.—F. H. Benjamin.

[1] Pan-Pac. Ent., X, pp. 12-16, 1934.

OBSERVATION ON A METHOD OF DISSEMINATION EMPLOYED BY MITES

BY WALTER EBELING

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In the course of some experiments made with the citrus red spider (*Paratetranychus citrie* McGregor), the writer had occasion to place thirty mites upon a single leaf of each of six orange seedlings. The petioles of the leaves were banded with Tanglefoot to prevent the mites escaping from the leaves. When the leaves were examined a week later they had turned to the whitish color typical of leaves heavily infested with mites. As many as eight mites per leaf were seen at one time lowering themselvs from infested leaves by means of single threads. Usually the mites were lowered to another leaf on the same seedling and resumed feeding on this leaf. As far as the writer is aware, no one before has noticed mites lowering themselves from leaf to leaf by means of threads.

Further observation showed that the mites left a leaf only when the mite population on this leaf had become large and the chlorophyll nearly depleted. A mite which successfully lowers itself to another leaf with more chlorophyll is, of course, at a great advantage as far as the food supply is concerned. Mites were also observed to leave the leaf in the manner mentioned in the previous paragraph when the leaf was not isolated by means of Tanglefoot.

It is possible that if mites were to lower themselves by means of threads in the open, especially on large trees, the wind would blow them away and carry them for some distance. The writer has observed species of the true spider family Attidæ lowering themselves at the ends of threads until the threads became quite long. Even a slight breeze would then be sufficient to carry the threads and spiders for long distances. The young of some spiders of other families climb to the tops of trees and fences and emit a single thread or group of threads and are carried aloft when the threads become long enough to be carried by the wind.

MILLARD CARR VAN DUZEE, IN MEMORIUM

BY E. P. VAN DUZEE

My brother Millard C. Van Duzee, a student of the Diptera, died at his home in Buffalo, N. Y., April 21, 1934, of a heart ailment. Our father, William S. Van Duzee, at that time a building contractor in New York City, took his family south to Mobile, Alabama, for the winter of 1859-60, but found the feeling there so strong against northern abolitionists that he came back to Cincinnati on a river steamer for the balance of the winter, and it was there that my brother was born on February 20, 1860. Millard's love of Nature was the result of both inheritance and environment. Our father was a naturalist of the old school, and had gathered extensive collections in Minerology, Geology, Botany, Conchology and Ornithology, sufficient to fill a three story annex to his home in Buffalo, the upper floor of which was an astronomical observatory for which he had purchased an acromatic refracting telescope with an 18-inch objective, at that time the largest privately owned telescope in the United States. Here and at father's farm at Lancaster, N. Y., where our summers were spent, we acquired the habit of observation as well as of collecting, both of which were encouraged by our father in every way possible. Some of the happiest days of our lives were spent on hunting trips through the woods with father while he was adding to his large collection of birds. Millard and I devoted our efforts mostly to the insects and together we built up our collection which we had in common. The paths about our country home at Lancaster were lined with flower borders and about these flowers we would hunt with our nets during the evening twilight for moths, or take them as them came to the lighted windows. About 1876 Mr. A. R. Grote, then Director of the Buffalo Society of Natural Science, taught us how to sugar for moths and how to dig for pupæ and to raise larvæ, and at the close of the season he determined our material for us; he also encouraged us to work in other orders of insects, so we formed a fairly good general collection of insects.

After father's death in 1883 Millard prepared himself for his father's former activities as building contractor, a trade he followed until failing health led him to retire from active

work. He began his systematic study of the Diptera in 1908, soon specializing in the Dolichopodidæ. Most of his collecting was done about Buffalo but he made several trips to New England and Washington, D. C., and at least two to Florida and two to California. He was a careful student and an industrious worker and in the 26 years he worked on the Diptera he has published 86 papers (1383 pages) in which he described as new nine genera and 914 species, besides doing much revisional work. This is an excellent showing considering that during much of that time he was following an exacting trade. His collection of about 20,000 Diptera and many insects of other orders was acquired by the California Academy of Sciences in 1931, including the types of a considerable portion of the species described by him. He passed away quietly while sitting at his study table. He leaves one son, Merrill, who lives at the family home in Buffalo.

The following bibliography of his writings on the Diptera includes all his papers known to me. A few others may be in the hands of printers to appear later. I have given the exact date of publication wherever possible. The journal Psyche gives no date of publication so in the case of papers from that journal and in a few other cases I have given the date the journal was received by me as a subscriber, which may in some cases be considerably later than the date of actual publication.

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AN APPARENTLY NEW PENTATOMID

BY E. P. VAN DUZEE

Rhytidolomia rita Van Duzee, n. sp.

Allied to *viridicata* Uhler, a little larger and stouter with a flattened head and more broadly expanded pronotal margins; olive-green, tinged in places with yellowish. Length 10 mm.

Head a fourth wider across the eyes than long, feebly convex across the base, the cheeks broadly depressed, sides feebly sinuate before the eyes. Pronotum about as in *viridicata* but more closely rugosely punctate with the latero-anterior margins broader. Antennal segments as 10:16:15:18:22, of *viridicata* as 8:18:12:16:18. Rostrum attaining middle of second ventral segment, its segments as 20:30:20:12, in *viridicata* reaching base of third ventral segment, its segments being as 18:30:20:16; otherwise as in *viridicata*.

Color olive-green tinged with yellow in places, especially at base of costa and on the connexivum.

Holotype, female, No. 3855, Calif. Acad. Sci., Ent., and one female paratype, taken by Dr. E. D. Ball, June 13, 1932, on the Santa Rita Mountains. This species certainly is near *viridicata* but it is larger, the head is broader before and more flattened, the form is more parallel, the scutellum is shorter behind the frenum, and the relative lengths of the segments of the antennæ and rostrum are different.

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THE HISTORICAL BACKGROUND OF ENTOMOLOGY IN RELATION TO THE EARLY DEVELOPMENT OF AGRICULTURE IN CALIFORNIA

(Continued from page 58)

BY E. O. ESSIG

Early California Insect Type Localities

The entire State of California may be looked upon as a gigantic type locality from which thousands of new species and genera of insects have been collected during the past one hundred years. The earliest important collecting grounds were those surrounding the military strongholds at the Presidios of Monterey and San Francisco, Fort Ross, and New Helvetia or Sutter's Fort. Later, during the early American occupation, extensive collections were made at Fort Tejon, Fort Yuma, and Camp Independence. Some of these are the localities chiefly referred to in this chapter.

Later collectors operated, first about the larger cities, and then into the adjacent open country. The Sierra have ever lured the naturalists and even to the present day the more inaccessible portions are being searched for additional rare or undescribed species. It will probably take another fifty years before all parts of the state will have been explored entomologically and all of the more conspicuous insects have been taken. As most of the collecting has been done during the summer periods, there is yet much to be accomplished during the autumn, winter, and early spring, when certain species appear, and are wanting later or earlier in the season. So far little has been accomplished in the way of collecting and classifying the apterous orders, Thysanura and Collembola, as well as certain other groups of insects such as the Corrodentia, Ephemerida, Neuroptera, Trichoptera, Strepsiptera, and Parasitic Hymenoptera. California is still a virgin and productive field for the systematic entomologists and will be for years to come.

Fort Ross,[1] established as a trading post and farming center by the Russians in 1812, became a rendezvous for many noted Russian collectors and, with the territory between Bodega Bay and Mount St. Helena, is the type locality of a great many common California and western insects particularly Coleoptera. Here collected J. F. Eschscholtz (1824), F. P. Wrangell (1833-5), G. Tschernikh (1833-41), F. Fischer (1840-41), E. L. Blaschke (1841), I. G. Vosnesensky (1840-41), and others. Among the prominent early entomologists who have described types from these localities are J. F. Eschscholtz, P. F. M. A. Dejean, M. de Chaudoir, G. Fischer von Waldheim, V. I. Motschulsky, C. G. Mannerheim, and E. Menetries. The settlement of Fort Ross was abandoned by the Russians in 1841 and soon reverted to a semi-wild condition in which state it has maintained practically all of its native insect fauna even to this day. Later coleopterists from all over the United States have sought specimens from this type locality. Among these may be mentioned J. L. LeConte, G. H. Horn, T. L. Casey, Carl Fuchs, E. C. Van Dyke, F. E. Blaisdell, and others. Blaisdell and Van Dyke, by their early and painstaking work, have taken practically all of the known species of this and the San Francisco Bay Region and their large collections, presented to the California Academy of Sciences, have preserved them for posterity.

San Francisco Bay Region was the chief collecting ground for all of the early explorers and naturalists. The Presidio, the Mission Dolores and the area between, now known as "Chinatown," were the earliest localities explored as were also the Pueblo Santa Clara, Mission San José and the Mission San Rafael. Natural conditions no longer exist in any of these localities except possibly the last two. The others are entirely changed, being largely encompassed by cities. Among the early collectors here were: Eschscholtz, Tschernikh, and Vosnesensky. All of the later entomologists collected here as long as there was opportunity to do so.

New Helvetia[2] was the name given to a settlement established at the present site of the City of Sacramento in 1839 by Capt.

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[1] See account in Bull. Calif. Hist. Soc.

[2] Nueva Helvecia or New Switzerland, so named from his native home. Upham, S. C., Scenes in El Dorado in the years 1849-50, (Philadelphia, 1878), pp. 555-562.

John Sutter,[3] who although a newcomer, became a Mexican citizen and official in 1840 and obtained a large tract of land from the Mexican Government in 1841. This grant consisted of eleven square leagues[4] and extended sixty miles north to the "Buttes." In 1841, Sutter built a fort 500 by 155 feet, with adobe walls eighteen feet high and three feet thick. In it were used some of the lumber, windows, and doors taken from Fort Ross. The structure was completed in 1844. A reproduction of the original fort with an historical museum in Fort Sutter Park is now one of the attractive places in Sacramento. The present site was purchased for $20,000 in 1888 with money raised by the Native Sons of the Golden West. In 1891 the State Legislature appropriated $20,000 and later $15,000 to restore the Fort. The work of restoration was begun September 21, 1891, and completed April 26, 1893. Many of the old adobe bricks made originally by the Indians were used in the walls.

Sutter's Fort was armed with forty-one cannon purchased from the Russians along with Fort Ross. Here was maintained, not only a base for military operations which eventually wrested California from Mexico, but a most important trading center and a rendezvous of incoming settlers from across the plains. Some of the noted arrivals and visitors to Fort Sutter during this early period were: 1841, first immigrant train; 1840-41, I. G. Vosnesensky, Russian naturalist from the St. Petersburg Academy of Natural Sciences; 1841, Captain Ringgold of the Wilkes Expedition; 1842, Commodore Thomas Catesby Jones who raised the American flag at Monterey; 1844, General John C. Fremont with his guide Kit Carson, on March 6, and the Stevens-Townsend-Murphy party which brought the first wagons into California from across the plains; 1845, James W. Marshall, discoverer of gold; 1846, the largest immigrant party. Some of the Donner party were among these last.[5]

Although hundreds and thousands passed through this early settlement there are few who have left its memory in the great

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[3] For a short, terse biography of Sutter see Thomas C. Russell's Life in California by Alfred Robinson (San Francisco, 1925), pp. 314-315; Revere, J. W., A tour of duty in California (New York, 1849), pp. 72-75; Schoonover, T. J., The life and times of Gen. John A. Sutter, (Sacramento, 1907), portrait of Sutter, 312 pp; Bidwell, John, Life in California before the Gold Discovery, Century Mag. vol. 41, pp. 166-169 (1890).

[4] A league is a variable measurement and equals from 2.42 to 4.6 English statute miles. A marine league is three geographic miles.

[5] Bidwell, J. C., Life in California before the Gold Discovery, Century Magazine, vol. 41, pp. 166-169, (1890).

museums of the world. I. G. Vosnesensky collected Coleoptera at New Helvetia in 1840-41 which was described by C. G. Mannerheim, and this original locality still appears in the most recent catalog of American Coleoptera,[6] much to the confusion of modern workers. In Cendaras'[7] story Sutter is pictured in one place as "reading a pamphlet on the best method of breeding silkworms" in 1855, and as having had a collection of butterflies which was destroyed along with all of his property by the squatters, following a court decision restoring his vast domains. Both of these references are most likely pure fiction, but it seems evident that a number of mountain insects like *Ctenucha rubroscapus* Menetries were obtained at New Helvetia from parties who collected them in the Sierra. P. J. M. Lorquin collected here at various times during the period from 1850 to 1859. Dr. H. H. Behr, George W. Dunn, Henry Edwards, James Behrens, Tryon Reakirt, J. G. Cooper, R. H. Stretch, W. G. W. Harford, G. R. Crotch, Thomas L. Casey, and many other famous collectors and entomologists, procured specimens there or in other parts of the Sacramento Valley before agriculture became so dominant in that great region.

Fort Tejon[8] was built in 1852 and established as a military post to protect immigrants from Mexican bandits and renegade Indians, and was of considerable importance until it was abandoned in June, 1861. "The site of the old fort is a grassy bowl-shaped valley in the heart of the hills. Little remains of the fort itself save some remnants of adobe walls and one fairly complete building of the former barracks. A bronze tablet, erected by the Bakersfield Chapter of the Daughters of the American Revolution was unveiled November 10, 1923."[9] The fort is located in Tejon Pass below Lebec, at about 3200 feet altitude. The present Tejon Pass should not be confused with the Tejon Pass described by Lt. R. S. Williamson in his explorations in

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[6] Leng, C. W., Catalogue of Coleoptera, (N. Y., Sherman, 1920), 470 pp.

[7] Cendaras, Blaise, Sutter's Gold, translated from the French by Henry Logan Stuart, N. Y. and London, Harper Bros., 1826. (Little truth and much fiction are well mingled.)

[8] Grinnell, Joseph. Old Fort Tejon, Condor, vol. 7, pp. 9-13 (1905); Newmark, Harris, Sixty Years in Southern California, 1853-1913. (N. Y., Knickerbocker Press, 1916), pp. 46, 194, 195, 204, 207, 222, 234, 248, 297, 317, 327, 333; Rider, Fremont, Riders California, a guide-book for Travelers. (N. Y., Macmillan Co., 1925), pp. 564-565.

[9] Rider, Fremont. Rider's California, A guide-book for Travelers N. Y., 1925, p. 565.

1853,[10] which lies about 15 miles farther east.[11] In the reports of Williamson the present Tejon Pass was designated as "La Canada de las Uvas" (Valley of the Grapes). It was about 35 miles from Bakersfield and 150 miles from Los Angeles. Here at Fort Tejon were stationed cavalry troops which were chiefly used for fighting Indians and many were the demands upon the garrison there for this purpose. It was finally broken up in June 1861, and the army property and baggage was moved to Los Angeles by Lt. Beale on thirty or more camels.

Fort Tejon was an early collecting ground of a number of leading American coleopterists and is, therefore, a type locality for many species. John Xantus de Vesey,[12] the Hungarian zoologist and botanist, collected there in 1857-8. His specimens were described later by Dr. J. L. LeConte,[13] who also collected there in 1850. Dr. George H. Horn,[14] during his connection with the army post there, collected a large number of beetles sometime between 1863 and 1867.

Camp Independence was established on Oak Creek, Inyo County, California, by Col. Evans on July 4, 1862, where troops were maintained during the Indian wars. The buildings were levelled by the earthquake of 1872[15] and new barracks immediately rebuilt. It was garrisoned continually from 1865 to 1877 when it was abandoned. The city of Independence gradually grew up and finally replaced the military camp. This camp was made a famous collecting ground by the eminent coleopterist George H. Horn, in 1863.

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[10] Reports of explorations and surveys for a route for a railroad from Mississippi River to the Pacific Ocean. 33d Congress, Senate Ex. Doc. No. 78, vol. 5, for years 1853-1854, p. 39 (1856); Albright, G. L., Official explorations for Pacific Railroads, 1853-1855. Univ. of Calif. Press, pp. 137-138 (1921).

[11] Since the preparation of this paper an article by J. C. Davis, "A List of the Coleoptera of Fort Tejon, California, appeared in the Bulletin of the Southern California Academy of Sciences, vol. 31, Sept.-Dec. 1932, pt. 3, pp. 75-87.

[12] Essig, E. O., A History of Entomology, Macmillan Co., New York, pp. 804-808, 1931.

[13] Essig, E. O., *Ibid*, pp. 680-685.

[14] Essig, E. O., *Ibid*, pp. 654-658

[15] "A contemporary newspaper account of the earthquake destruction at the fort states that 'all the buildings (adobe) are partially destroyed, though but few were thrown down.' The camp was reconstructed with frame buildings." W. A. Chalfont in a letter to the writer under date of February 12, 1927, from Bishop, Calif.

INSECT COLLECTING IN CALIFORNIA

BY E. G. LINSLEY AND R. L. USINGER

Oakland, California

The State of California has long been a paradise for insect hunters and has received a great deal of attention from both amateur and professional collectors during the last quarter of a century. In common with most localities it is not yet thoroughly collected so the worker is forever spurred on in his never-ending quest for interesting things. Even the most remote localities are now easily accessible and students of insect life have found favorable field conditions through almost the entire year. Entomologists who are unfamiliar with the topography of the second largest state in the Union are sometimes led into error by associating localities which may be 800 miles apart, may differ 14,000 feet in elevation, or which may be a part of the Sonoran Desert of northern Mexico or a portion of the Canadian and Alpine faunas to the north. In the present series of articles, the authors wish to take the reader on a number of short collecting trips to various well-known places which are characteristic of certain ecological habitats or faunal areas. Thus we will visit the beach at the ocean's edge, the dry foothill regions, the cold, high-altitude, Alpine areas, the broad central valleys, and the deserts to the south. In each locality an attempt will be made to give the general features of the topography, the climate, the flora, and the representative insects found there. It is hoped that the authors will be forgiven for laying stress on the Coleoptera and Hemiptera but, aside from the fact that these are the orders with which they are most familiar, these groups, along with the Lepidoptera, have been studied more extensively than any others in the west. Appreciation is expressed to Dr. E. C. Van Dyke and Prof. E. O. Essig for kindly reading the manuscript and offering many valuable suggestions.

MARIN COUNTY

On a promising day in April we arise early in anticipation of a day spent in the field. Since the season is sufficiently advanced for the blooming of the mountain lilac, *Ceanothus*, we leave home for a favorite collecting spot, Marin County. We cross San Francisco's Golden Gate by ferry and arrive at Sausalito, on the tip of the Marin Peninsula. Here we entrain for Mill Valley and soon reach our destination.

Mill Valley is at the foot of Mt. Tamalpais, popularly known as "The Sleeping Lady", which rises to a height of 2520 feet. To the west we see the dense green of the redwood forest of Muir Woods. This is a National Monument and is the most accessible grove of sequoias in California. It is typical of the entire coastal redwood belt. To the east, but out of sight, lies San Francisco Bay. We are now at approximately the center of Marin County, in the Coastal Transition Life Zone of California.

Impatient to be off we turn our steps toward Muir Woods. Upon entering the gloom of the redwood forest, our beating sheets produce little of insect life. A few examples of the small cupressophilous coccinellid, *Hyperaspis lateralis*, which is feeding upon mealy bugs, *Pseudococcus sequoiæ*, and an inoffensive and bedraggled-looking crane fly, are our scanty reward. However, at our feet are seen the peculiar nest-like turrets of a *Lycosa* spider which are constructed from the dead sequoia needles. Approaching a cleared area fortune favors us as we come upon some recently cut logs. It is the work of but a moment to capture an ovipositing female of the metallic blue wood wasp, *Sirex areolatus*, one of the few insects capable of living in the heart-wood of sequoias. A sharp blade applied industriously to the bark reveals the incompleted galleries of the redwood bark beetle, *Phlœosinus sequoiæ*. Rolling over a log several small, pale apterygota are exposed in the leaf-mold below. These prove to be *Campodea essigi*, *C. californiensis*, and *Neomachilus halophilus*. A chestnut-brown milliped, *Julus hesperus*, curls up when disturbed, emitting a noxious fluid, while the usual group of sow bugs, *Porcellio lævis*, seek cover. Across the clearing a circle of young redwoods indicates the remains of a former monarch which has succumbed to the ravages of time. Tearing apart the rotten sap-wood a colony of the redwood stag beetle, *Ceruchus striatus*, is discovered along with the giant carabid *Pterostichus ater*. A sudden buzz, a lunge, and one of us captures a fine example of the longicorn, *Anoplodera mathewsi*, a species confined to the cupressine trees. The day shows promise of being a successful one!

Emerging from the redwoods, we enter the oak-madrone forest on the lower slopes of Mt. Tamalpais. In the trees above us, a persistent clicking reveals the presence of the little black

cicada, *Platypedia minor*. The foliage of *Quercus agrifolia* yields a number of soft-bodied green and brown phasmids, the primitive *Timema californica* of Scudder, several square, brownish chrysomelids, *Syneta simplex*, and the grotesque, typically western neuropteron, *Raphidia oblita*. Clinging to the sheet beneath the leaves and other debris, the metallic blue-green weevil, *Deporaus glastinus*, and a slightly dazed green lacewing, *Chrysopa californica*, are discovered. Wind-broken branches give up the vari-colored bostrichid, *Psoa quadrisignata*, while on the longer-dead, inner branches the cocoon-forming anobiid, *Hedobia granosa*, the wingless, ant-like clerid, *Cymatodera ovipennis*, and a squat, hairy, lichen-colored longicorn, *Pogonocherus crinitus*, are found. Amid the rubbish of the beating sheet an obscure, mycetophagous flat bug, *Aradus fuscomaculatus*, is concealed. Disturbed by the beating of a catocala, *Catocala californica*, is netted as it forsakes the protective background of an oak trunk.

Moving onward up the trail our attention is arrested by a scurrying red-bordered pyrrhocorid which proves to be the not uncommon *Euryophthalmus cinctus californicus*. On an elderberry bush we find the rare *Desmocerus californicus* which, in spite of its bright-colored clothing, is not easily distinguished from its surroundings. This species is confined to the blueberried elder whereas its relative, *D. cribripennis*, occurs on the red-berried elder nearer the coast. The turning of a stone disturbs the wingless, nocturnal cicindelid, *Omus californicus*, and a few sleepy camel crickets, *Gammarotettix californianus*. Encouraged, we uncover in quick succession the formidable sand cricket, *Stenopelmatus*, the ever-present *Pterostichus californicus*, and a late specimen of the shiny black carabid, *Promecognathus lævissimus*. The latter is a relic of the past with its only close living relative in South Africa. After interrupting the helicoid meal of a snail-eater, *Scaphinotus striatopunctatus*, we continue toward the chapparal slopes above.

The chapparal formation consists of *Ceanothus*, *Baccharis*, Manzanita, Chamise, and related shrubby plants. Here we find some of our best collecting! A pale swallow-tail, *Papilio eurymedon*, flutters lazily past indicating the proximity of the golden-leafed oak, *Quercus chrysolepis*. As our beating sticks descend upon the *Ceanothus*, numerous insects fall amid a shower of

blossoms upon our sheet. We hastily capture the highly-colored *Callimus ruficollis* and *C. cyanipennis*, a fine specimen of *Dicerca horni*, and a score of small lace-bugs, *Corythucha maculata* and *C. distincta* which are patiently flicked into our bottles. However, a discordant note is struck as we observe several ticks, *Dermacentor occidentalis*, crawling upon our clothing. This situation is quickly remedied and we turn our attention to the red-barked manzanita, *Arctostaphylos*. Patient beating discloses several small plant bugs, *Phytocoris cuneatus*, the rare cerambycid, *Neoclytus interruptus*, and numerous tumbling black scarabs, *Serica anthracina*. The chapparal broom, *Baccharis*, yields the common and characteristic plant bug, *Lygus sallei*, several wierd little treehoppers, *Philya californiensis*, and a single example of the much sought after *Chrysobothris bacchari* of Van Dyke. On the tips of the shoots are seen the globular, green and red, dipterous galls, *Rhopalomyia baccharis*, and the more flattened and elongated swellings of *R. californica*.

A field of grass and flowers induces us to exchange our beating sheets for sweeping nets. Here, for the first time, we collect a few of the small black grass bugs, *Irbisia californica*, *I. mollipes*, *I. sita*, and *I. solani*, which have been teeming about our feet. Sweeping a clump of buttercups, *Ranunculus californicus*, we net the slender brown elater, *Agriotes imperfectus*, a number of small negro bugs, *Corimelaena anthracina*, and several andrenid bees, *Andrena lustrans*. In addition, the ever-present *Anthaxia æneogaster* is very abundant on the California poppy, *Escholtzia*, as is the pollen-feeding nitidulid, *Amartus tinctus*. In company with these we take the hairy march fly, *Bibio hirtus*, the greenish-black *Leptacmæops spuria*, and several blister beetles, *Lytta stygica*. An occasional specimen of a small lycænid, *Plebejus behri*, is seen. The umbelliferous yarrow milfoil harbors *Trichodes ornatus*, the larvæ of which are parasitic in the nests of bees, several *Mordellistena*, and *Acmæops tumida*. Also numerous small predaceous bugs, *Triphleps tristicolor*, are feeding upon the thrips, *Frankliniella minuta*.

Continuing our ascent, we reach the summit of Mt. Tamalpais where we partake of our noonday repast. In the grass about us an occasional brown lubber grasshopper, *Agymnastus ingens*, is discovered which so closely resembles its surroundings as to almost defy detection.

Our leisurely return down the mountain in the afternoon is interrupted by the periodic "cheeping" of the fork-tailed katydid, *Scudderia furcata*. Resuming our beating, toyon berry, *Photinia arbutifolia*, showers our nets with more lace-bugs, *Corythucha heteromelecola*, and the cumbersome *Dascillus davidsoni*. A spray of wild rose produces the red and black weevil, *Rhynchites bicolor*, and from a branch of poison oak, *Rhus diversiloba*, a short-winged cerambycid, *Molorchus longicollis*, and a fulvous flea beetle, *Leptotrix recticollis*, are gingerly rescued.

Attracted by the sound of wood-cutting, we leave the trail and are delighted to find some recently cut madrone, *Arbutus menziesii*, and live oak, *Quercus agrifolia*. On the madrone the wasp-like *Neoclytus conjunctus* and its beautiful red and blue predator, *Chariessa elegans*, are found along with a single example of the very rare *Clytus blaisdelli*. *Xylotrechus nauticus* swarms upon the oak logs with the lead cable borer, *Scobicia declivis*. Beneath these logs a colony of the subterranean termite, *Reticulitermes hesperus*, is discovered.

In a nearby ravine along a small stream Grinnell's dusky-wing, *Erynnis persius pernigra*, and the umber skipper, *Poanes melane*, are found. On the water the usual water striders, *Gerris remigis*, skate about while below the surface dytiscid beetles, *Agabus sp.*, and the black shining hydrophilid, *Tropisternus californicus*, are swimming in company with some back swimmers, *Notonecta insulata*, and water boatmen, *Arctocorixa sp.*

Along the bank of the stream some mint calls again for our sweeping nets. In the slanting rays of the sun a fine series of striking pentatomids, *Cosmopepla conspicillaris*, *C. uhleri*, and *Eysarcoris intergressus*, is taken.

With this we bring our collecting day to an end and turn our steps toward the Mill Valley station satisfied that Marin County has once again provided us with a fruitful day in the field.

NOTES AND DESCRIPTIONS OF SOME CERAMBYCIDÆ FROM THE TRES MARIAS ISLANDS

BY E. GORTON LINSLEY

Oakland, California

The Tres Marias are a group of islands seventy-five or eighty miles off the coast of Mexico, below the entrance to the Gulf of California. In May, 1925, an expedition of the California Academy of Sciences visited these islands and among the Cerambycidæ taken at that time, the following seem noteworthy:

Smodicum pacificum Linsley, new species

Elongate, flat, parallel, pale testaceous, shining, sparsely clothed with suberect, yellowish hairs. Head closely, moderately finely punctured, wider than prothorax (♂), narrower than prothorax (♀); antennæ rather stout, sparsely ciliate, extending a little past the middle of the elytra (♂), nearly to middle of elytra (♀); segments three to eleven subequal in length but decreasing gradually in diameter toward apex. Prothorax as long as broad (♂), feebly transverse (♀), widest at basal third and gradually narrowed anteriorly (♂), hexagonal and widest at middle (♀); disk strongly flattened, moderately finely and not closely punctured; prosternum strongly depressed at sides (♂), uniform throughout (♀). Elytra three times as long as broad, less finely and more closely punctured than prothorax; apex a little dilated; apices separately rounded. Ventral surface shining, finely, sparsely punctured; fifth ventral abdominal segment transverse, shorter than fourth (♂), rounded at apex and longer than fourth (♀). Legs short; femora strongly clavate; tibiæ and tarsi together scarcely longer than femora. Length 6-8 mm.; breadth 1.3—2 mm.

Holotype male (No. 3884), allotype female (No. 3885, C.A.S. Ent.) and seven paratypes taken on Magdalena Island, Tres Marias, May 19-20, 1925, by Mr. H. H. Keifer. One pair of paratypes remain in the collection of the writer, the remainder in the collection of the California Academy of Sciences.

This species is related to *S. parandroides* Bates with which it agrees in having the head rather suddenly and obliquely narrowed behind the eyes. It may be easily distinguished from that species, however, by the more even and scarcely sulcate vertex of the head, the prothorax widest at or behind the middle rather than at apex, and the finer, sparser punctation of the entire upper

surface. From *S. cucujiforme* Say, it differs in the shape and proportions of the prothorax, the strongly and obliquely narrowed head behind the eyes, and the finer, sparser punctation of the head, prothorax, and elytra.

EBURIA STIGMATICA Chevrolat

One male, captured on Magdalena Island, Tres Marias, May 19, 1925, by Mr. Keifer. Although typical *E. stigmatica* has a long spine at both the sutural and outer apical angles of the elytra, the above example has the sutural spine much reduced and the outer spine absent, the angle being merely dentiform. In spite of this difference and a distinct reddish cast to the specimen, it seems best referable to this species.

Eustromula keiferi Linsley, new species

Stout, rufo-piceous, densely clothed with recumbent, yellowish pubescence. Head coarsely, rugosely punctured; antennæ attaining the middle of the elytra (♀), densely pubescent, sparsely ciliate, segments three to six with a short spine at the apex, segments five to seven excavated beneath. Prothorax transverse, very coarsely and irregularly punctured; disk with three polished, triangularly arranged, tubercles. Scutellum densely pubescent. Elytra slightly more than twice as long as broad, densely clothed with suberect, yellowish pubescence which is intermixed with conspicuously longer hairs toward apex; apices truncate with the inner angle spiniform. Metasternum finely punctured at sides, very coarsely punctured at middle; abdomen clothed at sides with short, recumbent, yellowish pubescence intermixed with longer suberect hairs; fifth ventral segment rounded at apex (♀). Length 13 mm.; breadth 6.75 mm.

Holotype female (No. 3886, C.A.S. Ent.), Maria Madre Island, Tres Marias, May 21, 1925, H. H. Keifer.

E. keiferi agrees with *E. validum* LeConte in those characters of generic importance but differs markedly in the long, dense pubescence covering the entire body. It may be further differentiated by the more transverse prothorax and very coarsely punctured metasternum.

ELAPHIDION IRRORATUM Linn.

Four specimens taken at Maria Madre, Tres Marias, May 17-21, 1925, by Mr. Keifer. In one of the examples the white pubescence covers nearly the entire upper surface.

ANOPLIUM RETICOLLE Bates

Four examples of this obscure little species were captured at Maria Madre, Tres Marias, May 15-21, 1925, by Mr. Keifer. Originally described as a *Peribœum*, the species seems equally ill-placed in *Anoplium*. Eventually it will probably form the basis of a new genus along with *A. bimaculatum* Bates and several other species characterized by the peculiar alveolate sculpture of the prothorax.

IRONEUS PULCHER Bates

A single specimen of *I. pulcher* was taken on Magdalena Island, Tres Marias, May 20, 1925, by Mr. Keifer. This is apparently the first Mexican record for this species. It was described from Chontales, Nicaragua.

CLEOZONA RUFIPES Bates

One example, Maria Madre, Tres Marias, May 21, 1925, collected by Mr. Keifer. This appears to be a valid species and not a variety as placed by Bates. It differs in the larger size, the more slender form, the rather widely separated eburneous elytral fasciæ, the broader red belt of the elytra, and in having all of the legs red, clothed with recumbent, white pubescence.

LAGOCHEIRUS OBSOLETUS Thomson

Two specimens, Maria Madre, Tres Marias, May 21, 1925, H. H. Keifer.

Leptostylus plumeoventris Linsley, new species

Short, slightly convex, reddish-brown, clothed with white, brown, and yellowish pubescence. Head rather densely clothed with short, recumbent, white and brownish pubescence; antennæ slender, densely pubescent, mottled with brown and white, segments annulated at apex. Prothorax transverse, disk tuberculate, coarsely punctured; pubescence condensed into irregular patches of yellowish and whitish scale-like hairs; sides behind the middle armed with an obtuse lateral tubercle. Elytra about twice as long as broad, coarsely but not closely punctured; pubescence moderately dense, with two rather well defined longitudinal yellow vittæ and an acute white band extending from suture at middle to lateral margin at apical one-fourth; surface with scattered tufts of suberect setæ, apices separately rounded. Femora densely clothed with brown and white pubescence; tibiæ white, annulated with brown;

first segment of posterior tarsus shorter than second and third together. Ventral surface densely, irregularly clothed at sides with white pubescence, giving a flaky, mottled appearance; punctation very fine, close. Length 8 mm.; breadth 3.5 mm.

Holotype male (?), (No. 3887, C.A.S. Ent.), captured at Maria Madre, Tres Marias, by Mr. Keifer.

L. plumeoventris is closely allied to *L. falli* Linsley from Arizona, but differs from that species in the shorter, more obtuse, lateral prothoracic tubercles, the more abundant tufts of suberect setæ on the elytra (particularly at the sides), and in the peculiar, flake-like arrangement of the pubescence on the ventral surface.

Note Regarding the Secondary Sexual Characters in Phlœodes (Coleoptera, Tenebrionidæ)

In the males of the species of Phlœodes Lec. on the under surface of the femora, at middle, there is an oval, flat, tumid area, clothed with golden pubescence, surrounded by a smooth raised margin. Apparently this secondary sexual character has been entirely overlooked. Le Conte (Proc. Acad. Nat. Sci. Phila., 1859, p. 77) does not mention it; Casey (Can. Ent., Vol. XXXIX, 1907, p. 42) has overlooked it and Horn (Revision of the Tenebrionidæ) likewise did not observe this important character.—F. E. Blaisdell, Sr.

Note Concerning Apsena barbaræ Blaisdell (Coleoptera: Tenebrionidæ.)

In the Trans. of the Amer. Ent. Soc., vol. LVIII, p. 61, I described *Apsena barbaræ*, giving as one of the differential specific characters the short even elytral pubescence, as compared with that of *Apsena pubescens* Lec. which has the elytral hairs longer and irregular in length. *Barbaræ* is most often found in ants' nests. In my Monographic Revision I remarked that perhaps the ants had "bobbed" the pubescence, as most of the specimens observed with ants have the hairs short and even. Since writing my paper I have reared numerous specimens and all emerged with pubescence as in *pubescens* Lec. This does not, however, invalidate the species, as *barbaræ* is distinctly more robust and when matured the head and pronotum is piceous to dark nigro-piceous. In *pubescens* Lec. the form is more elongate and the head and pronotum are rufous to a varying degree.—Frank E. Blaisdell, Sr.

THE PROSTHECA OR MANDIBULAR APPENDAGE

BY RICHARD E. BLACKWELDER

Stanford University, California

In 1826 Kirby and Spence[1] recorded the existence on the mandibles of certain Staphylinid beetles of a membranous appendage which they named the prostheca. Since that time there have been references to similar organs in many insects,[2] and the term prostheca has been applied to various structures without any proof of their homology. It is not intended in the present paper to attempt to homologize any of these structures with the prostheca, or to try to cite all the references to them, but rather its purpose is to fix definitely the meaning of the word "prostheca" as originally proposed.

Kirby and Spence describe the prostheca as follows:

"Under this head I must not pass without notice an appendage of the mandibles, to be found in some of the rove-beetles (Staphylinidæ), as in *Ocypus, Staphylinus,* and *Creophilus* Kirby. In the first of these it is a curved, narrow, white, subdiaphanous, submembranous, or rather cartilaginous piece, proceeding from the upper side of the base of the mandible; in the second it is broader, straighter, and fringed internally and at the end with hairs; and in this at first it wears the appearance of being attached laterally to the mandible under the tooth, but if closely examined, you will find it is separate; in *Creophilus maxillosus* it is broader. This is the part I have named *prostheca.* It is perhaps useful in preventing food from working out upwards during mastication."

The American representative of *Ocypus* [*O. ater* (Grav.)] has a mandible differing considerably from the figure given by the above writers but very similar to that actually found in *Creophilus.* Their figure of the mandible of *Ocypus* is so simple and indefinite that it seems most likely that the structure which was depicted by them is the true homologue of the one found in *Creophilus* as stated above. They do not give a figure of the prostheca of *Creophilus* but refer to one given by Olivier in 1795.[3] This figure is also rather indefinite as to the details,

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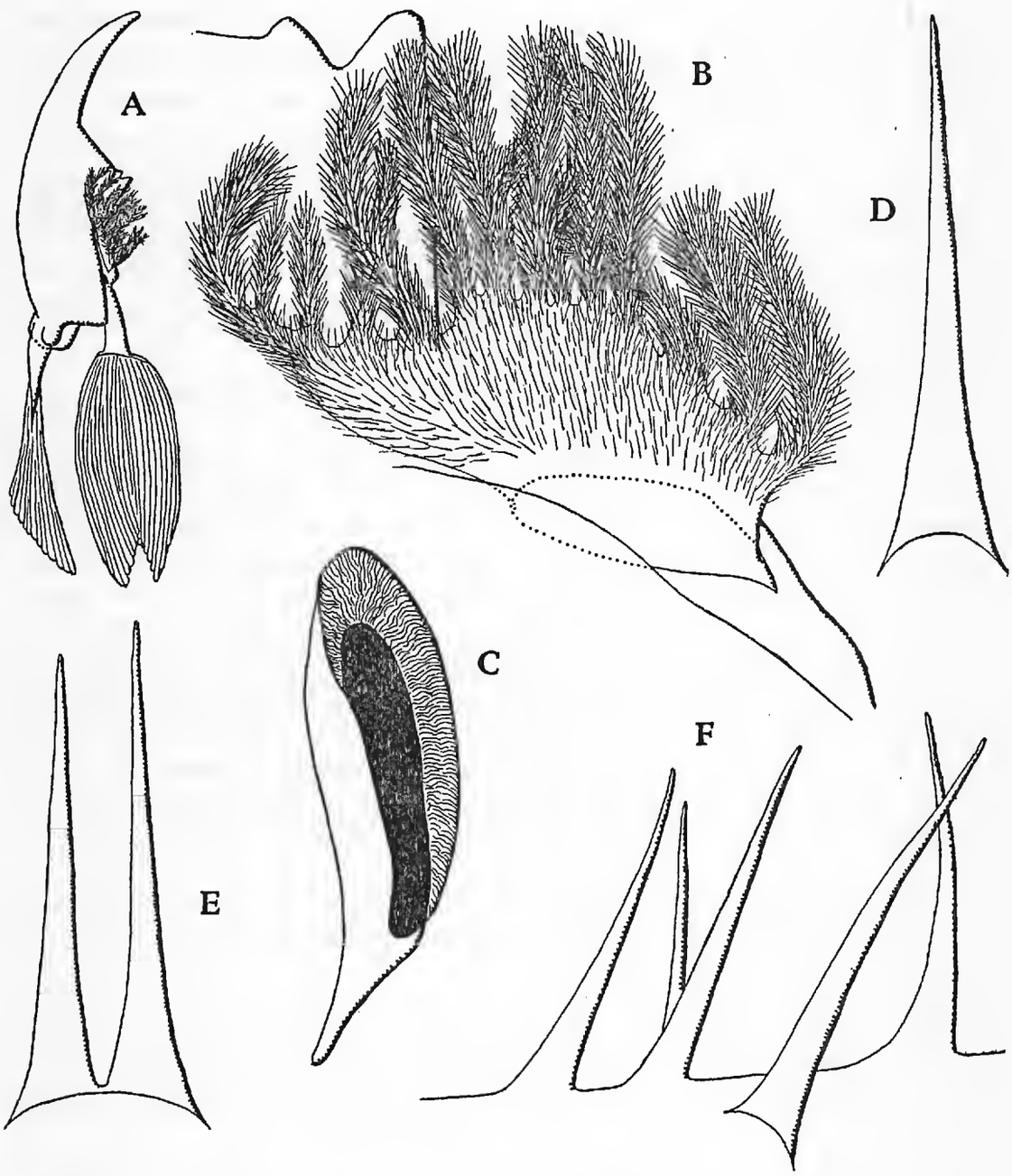
[1] An Introduction to Entomology, Vol. III, pp. 438-439, XIII, fig. 7 c". (1826).

[2] For example: *Lacinia mobilis* in many beetle larvæ (Böving); *pharyngeal bracon* in Rhynchophora (Hopkins); *prostheca* in *Passalus*; *lacinia* in *Campodea* (Meinert); *second mandibular joint* in Trichopterygidæ (Wood-Mason); *inner lobe* of Scarabæoidea (Packard); *lacinia-lake process* of Ephemerid nymphs (Heymons); etc.

[3] Entomologie, Coleopteres, Tom. III, Pl. I, fig. 1 b. (1795).

but represents a mandible very similar to that of *Creophilus villosus* (Grav.), which is the American representative of this genus. A hairy inner lobe is indicated and is evidently the structure referred to by Kirby and Spence.



EXPLANATION OF FIGURE

Figure 1. Prostheca of *Creophilus villosus* (Grav.). A, ventral aspect of right mandible, showing position of prostheca and muscles; B, prostheca projecting from its foramen; C, prosthecal foramen from the side (the foramen at the base of a declivity); D, E, F, spine-like processes of the prostheca and its lobes.

Figure 1 gives the details of structure and position of the prostheca of *Creophilus villosus* (Grav.). It is situated on the inner face of the mandible (A) just below the tooth. This face is somewhat concave and rather membranous, forming a short longitudinal groove. At about the middle of this groove is an ovate depression with an opening into the interior of the mandible (A, B, and C). From this foramen projects a membranous lobe or prostheca (A and B). The prostheca extends cephalad and mesad of the foramen, branching into numerous lobes, and closely beset with fine hairs or processes. As the term hair is generally understood to be synonymous in its morphological sense with the term seta, the present structures are best called processes, as they are not set in sockets of the cuticula but are merely finely pointed extensions of the body wall (D, E, and F.) No muscles have been observed on the prostheca in this study, and the mobility of the organ is due entirely to its soft membranous character, rather than to any segmentation or articulation.

The prostheca present in *Staphylinus* and many other Staphylinids is very similar to that described above. Differences seem to be chiefly in form and size, rather than in position on the mandible.

The prostheca as found in these representatives of the subfamily Staphylininæ may be taken as the type example of this structure. Attempts to homologize similar structures with this may well result in valuable conclusions to the study both of morphology and of classification. It is hoped that such attempts will be made easier and more productive by this record of the structure to which the name prostheca was originally applied.

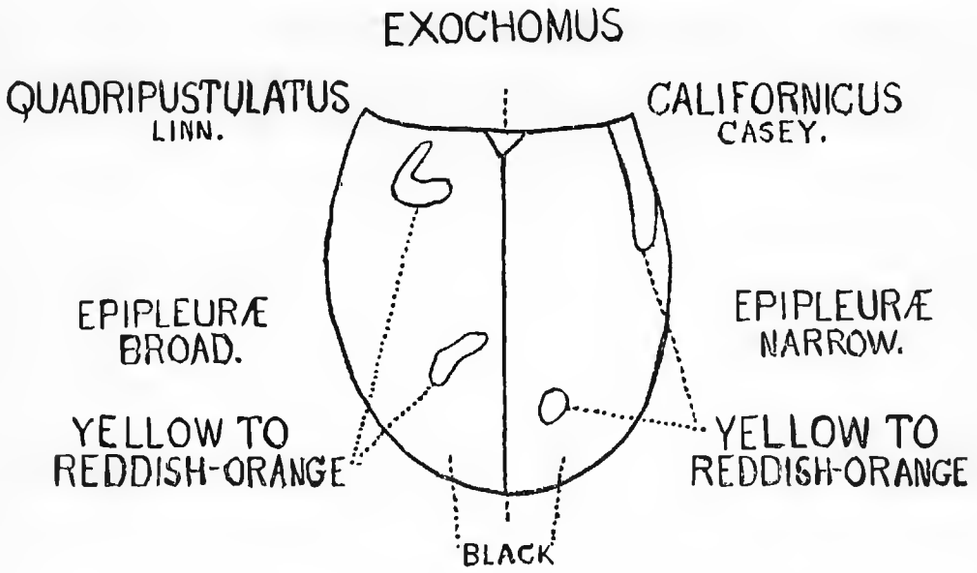
STUDIES AMONG THE COCCINELLIDÆ, No. 7

(Coleoptera)

BY F. W. NUNENMACHER

Piedmont, California

Some years ago the State of California imported from Europe a number of Coccinellidæ, among them the *Exochomus quadripustulatus* Linn. This species has spread to many parts of the state. It has been taken by several students and labelled *E. californicus* Casey. I have made a crude drawing which should



enable one to separate these species at a glance. *E californicus* already has had some juggling. Dr. J. Weise first called it a variety but after I had sent him a few specimens he stated that it was a valid species.

Brumus blumi Nunenmacher, n. sp.

Color black throughout, polished above, under surface and legs opaque, tibiæ and tarsi fuscous.

Form oval, not strongly convex. Head finely and thickly punctured. Pronotum and elytra very faintly punctured, the punctures hardly visible with a low power lens. Length 2.25 to 3.25 mm., width 1.25 to 2.25 mm.

Holotype, male, allotype, female, and eight paratypes in my collection. Paratypes also in the collections of J. E. Blume and Willard Nutting.

Type locality: Moraga, Contra Costa County, California.

This species can readily be separated from *B. œthiops* Bland, or its variety *mormonicus* Casey by its smaller size, oval form and in being less strongly convex. The only difference I found in some 80 specimens examined was in the size. I dedicate this species to its discoverer, John E. Blum, who, with Willard Nutting, took it in large numbers.

THE SUBSPECIES OF CHLÆNIUS LEUCOSCELIS CHEV. (COLEOP., CARABIDÆ) WITH A NOTE ON A FUNCTION OF MUSEUMS

BY P. J. DARLINGTON, JR.

Museum of Comparative Zoölogy, Cambridge, Mass.

Mr. H. C. Fall, prompted by an inquiry from Mr. Hugh B. Leech, has recently called my attention to the fact that all his western specimens of *Chlænius leucoscelis* Chev. agree with Chaudoir's (1876) and Horn's (1876) tabular characters (profemur of ♂ angulate below near base, and ventral segments smooth at middle) but that his eastern ♂♂ have the front femur not angulate and all his eastern specimens have the abdomen sparsely punctate at middle. Upon consulting the literature I find that *leucoscelis* was originally described by Chevrolat from Vera Cruz, southern Mexico. The form of the ♂ profemur is not mentioned. The Museum of Comparative Zoölogy possesses a series of 11 specimens (9♂, 2♀) from Oaxaca, southern Mexico, and 1 (♂) from Guatemala City, Guatemala, which are apparently typical of the species. The ♂ profemur is rather strongly angulate and the abdomen is smooth at middle. Also in the M. C. Z. are specimens from California (♂♂♀), Arizona (9♂, 7♀; including the unique ♂ type of *Chlænius monachus* Lec.), Texas (3♂, 3♀), and Chihuahua, northern Mexico (4♂) which resemble the Oaxaca specimens closely except that the ♂ profemur, while still distinctly angulate, is a little less strongly so. The M. C. Z. specimens from Spokane Falls, Washington (3♂, ♀) and vicinity of Durango, Colorado (9♂, 2♀) are also closely similar to typical *leucoscelis*, but the ♂ profemur nearly or quite lacks the basal angulation. Two specimens from Roseburg, Oregon and one from St. George, Utah are unfortunately all ♀♀, but agree with other western specimens in asexual characters.

The museum's material from the East, which answers the description of *Chlænius cordicollis* Kby. (described from Canada) includes specimens from Quebec (♂♀), Vermont (3♀), Massachusetts (7♂, 4♀), New York (♂♀), Pennsylvania (7♂, 6♀), Virginia (♂), Ohio (2♂, 3♀), Illinois (2♀), and Lake Superior (♂). The eastern ♂♂ nearly or quite lack the angulation of the profemur just as Colorado and Washington

specimens do. In other characters, however, the western and eastern series are readily distinguishable, as follows:

Western Specimens	*Eastern Specimens*
Specimens average slightly smaller and more slender.	Color usually greenish or grayish, rarely bright blue.
Color bluer, less commonly greenish or grayish.	Regions specified distinctly rugose or punctate.
Prothorax usually more cordate, with sides more sinuate before base.	Abdomen with sparse, fine punctuation at middle.
Head near base of eyes, and pronotum near sides anteriorly not distinctly punctate.	Profemur of ♂ not, or indistinctly angulate.
Abdomen smooth at middle.	
Profemur of ♂ variable (as described).	

The size and color differences are by no means constant, though noticeable in series. The differences in punctuation are well defined, however, in spite of a little individual variation.

Horn (1876) in dealing with the forms just discussed, lumps them under the name *leucoscelis* Chev. He did not notice differences in the ♂ profemur or in the punctuation of the abdomen, and minimized the value of other characters. Chaudoir (1876) also failed to notice femoral and abdominal differences, but separated the eastern and western forms as species on other characters. There can be no question that these two forms really are different. They should be listed either as species or as well defined geographical subspecies, the category depending entirely upon the custom or preference of the author. It seems to me best to consider them subspecies. I do not mean by this term, as some writers apparently do, that I doubt the distinctness or recognizability of the forms in question. I mean that I believe they are recognizably differentiated *geographical* forms of a single widely distributed original population, and that their relationship is most naturally and conveniently shown by the use of trinomials, as similar relationships are shown in the present classification of most vertebrates and many invertebrates. I regard the slight geographical differences in form of the ♂ profemur as not sufficient to justify the division of *Chlœnius leucoscelis* into additional western subspecies at present. The following, then, seems to be the most satisfactory classification of the species: *C. leu-*

coscelis leucoscelis Chev.[1] 1834, Col. Mexique, Cent., I, 4, nr. 23. Chd. 1876, Ann. Mus. Civ. Genova, 8, 190; Horn 1876, Trans. Am. Ent. Soc., 5, 266; Casey 1914, Memoirs, 5, 35.

monachus Lec. 1851, Ann. Lyc. N. H. New York, 5, 180.

Range: southern Mexico and Guatemala to Washington, Colorado, Utah, and Texas.

C. leucoscelis cordicollis Kby. 1837, Fauna Boreali-Americana 4, 22; Chd. 1876, *l. c.*, 188.

Range: eastern Canada to Lake Superior and Virginia.

This brief study of *Chlœnius leucoscelis* emphasizes a function of public museums which many entomologists fail to appreciate —the accumulation of large series of specimens. I have heard it insinuated that large museums, by acquiring one relatively small collection after another, are not much better than dogs in mangers; that most of the specimens they take in are merely duplicates which they dispose of at the first opportunity, and which other institutions could use to better purpose. This is really very far from the truth. It is true that many *species* are duplicated in nearly every private collection of beetles which this museum receives, but the *localities* from which the specimens come are comparatively rarely duplicated. To give examples from the present paper, all our Oaxaca and Guatemala specimens of *C. leucoscelis* are from a duplicate collection of *Biologia* material received from Salvin and Godman; all our California specimens are in the Leconte Collection; all the Washington specimens, from Bowditch and Hayward; those from Chihuahua, from Bowditch; the interesting series from Colorado, from Bowditch, Hayward, and Bolster; all specimens from Ohio, from Gehring, those from Quebec, from Blanchard; etc. Taken as a whole, the museum's collection of *leucoscelis* (99 specimens with more or less definite locality labels, as well as 27 unlabeled) is from localities surprisingly well distributed over the known range of the species, and shows geographical variation as none of the single collections which we have received could possibly do. Very few private collectors can afford to accumulate series of scores or hundreds of specimens of each species. It therefore

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[1] This bibliography includes only references of real taxonomic importance; references to records of capture, habits, etc. are omitted. The synonymy of typical *leucoscelis* should probably include *Chlœnius gilensis* Csy. (1914, p. 35) and *C. sanantonialis* Csy. (1914, p. 36). However, I have not yet had the opportunity of examining Casey's types.

becomes a function of the museum to do so, and to file the material away so that it will be available for reference at any time. I think that this function is no less important than the museum's more obvious duty of preserving types and other historical specimens from generation to generation. Both functions are necessary to make possible thorough and satisfactory taxonomic work.

Two Good Books

Dr. Imms[1] has now placed entomological students under renewed obligations by publishing a new revised edition of his Textbook of Entomology, the second edition of which appeared in 1929 and at once took its place as one of the leading textbooks on entomology. The present edition is a thorough and careful revision of the earlier work bringing it abreast of the science of entomology as it stands today. The author has avoided the extreme views of certain of our entomological systematists for which he is to be highly commended. We notice that he uses the name Hemiptera for the combined Heteroptera and Homoptera, a logical arrangement that will be appreciated by all whose studies cover both suborders. He includes the Mallophaga in the Anoplura and employs the familiar Odonata in place of the recently used Paraneuroptera. He has treated very fully the morphology of each of the 23 orders he recognizes, and under classification gives keys to the families of each of the orders. The 624 illustrations will be found a great aid to beginners and the 727 pages are crowded with information, concisely presented. The book will be found indispensible in the work of all general students of entomology.

The publication of Dr. Curran's manual of the Diptera[2] is another milestone in the history of American entomology. It is a profusely illustrated royal 8vo volume of 512 pages. In addition to interesting prefatory matter it includes keys to all taxonomic groups down to the genus. Dr. Curran does not recognize subgenera, such a unit to him being either a genus or a synonym. The work replaces Williston's Manual, now out of print and somewhat out of date. No student of the Diptera can afford to be without this volume.—E. P. Van Duzee.

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[1] Imms, A. D., A General Textbook of Entomology, 3d edn., N. Y., E. P. Dutton & Co., 1934

[2] Curran, C H., The Families and Genera of the North American Diptera. N. Y., publ. by the Author, 1934.

TWO SPECIES OF MECOPTERA FROM ALASKA*

BY LOWELL C. LLOYD

As the only previous report of the occurrence of the genus *Boreus* from Alaska is that of *B. borealis* Banks from St. Paul Island in the Bering Sea, a note on the occurrence of two species on the mainland should be of interest. The following account is based on four specimens, one male and one female of a species described as new and closely related to *B. borealis* and two females of *B. unicolor* Hines. All were collected between Kennecott and McCarthy, Alaska, on the snow, April 15, 1934, by Mr. Wilbur Lloyd.

Boreus intermedius Lloyd, n. sp.

Male: Length of body 3.5 mm; body very dark brown, almost black; eyes brown; beak (except base), wings, legs including coxæ and pleura light yellowish brown; posterior margin of hypandrium entire; outer margin of wings abruptly curved, base sloping back medially.

Female: Length of body 4.5 mm; color as in male; ovipositor nearly twice length of beak; wing pads slightly lighter in color than body, reaching to middle of metanotum.

Holotype (male) and allotype (female): Between Kennecott and McCarthy, Alaska, April 15, 1934, on snow; both in collection of Washington State Museum, University of Washington, Seattle.

As will be apparent from the above description *B. intermedius* is very similar to *B. borealis.* The female agrees perfectly with descriptions of that species (Banks 1923; Carpenter 1931) while the male differs in the shape of the wings which approach the form found in *B. californicus.* The figure will make this readily apparent.

BOREUS UNICOLOR Hines

This species has been reported from Bozeman, Montana, and one female has been taken at Reno, Nevada (Carpenter 1931). The present specimens, both females, are uniformly an extremely dark brown or black in color, the wing pads being a little lighter.

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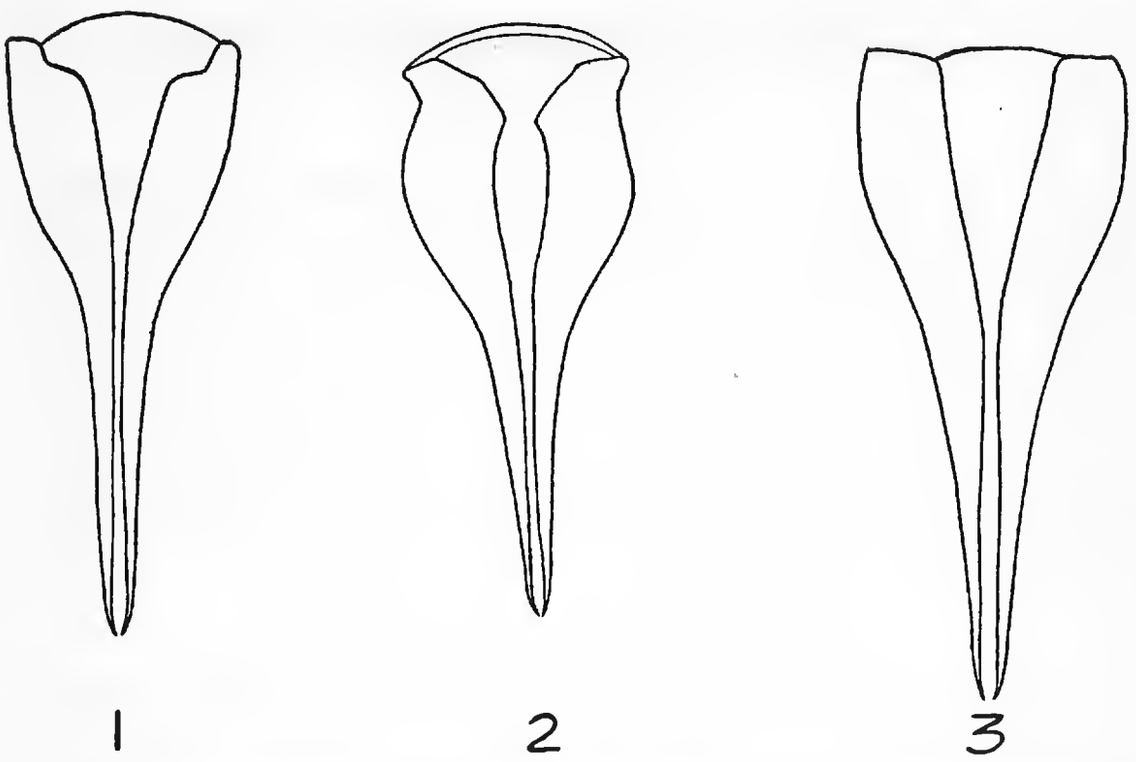
*Contribution from the Department of Zoology of the University of Washington.



1. *B. californicus;* 2. *B. intermedius;* 3. *B. borealis.* Figures 1 and 3 after Carpenter.

One is somewhat smaller than that given for *B. unicolor* but appears to be abnormally contracted, while the other specimen is a full 5 mm in length. The ovipositor is not quite twice as long as the beak but in all other respects the Alaskan specimens agree with published descriptions of the female of *B. unicolor* Hines.

Both specimens have been deposited in the Washington State Museum on the campus of the University of Washington, Seattle.

The author is indebted to Professor Trevor Kincaid and Dr. Melville H. Hatch for their kind assistance in the preparation of this paper.

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NEW SPECIES OF OROBANUS

BY EDITH W. MANK

Lawrence, Mass.

Up to the present time, the genus Orobanus has included three species, one of which, *O. simulator*, was described by LeConte in 1878 and the other two, *O. rufipes* and *O. densus*, by Casey in 1886. The first is recorded as occurring in Colorado, Vancouver, and California while the other two are described from California.

To these three species are here added descriptions of three additional ones, together with a table including all known species. In the preparation of these records I am greatly indebted to Dr. H. C. Fall for his helpful advice and for the privilege of describing two of the following species which are in his collection.

Orobanus montanus Mank, new species

Figures 1-3

Brownish in color, head and abdomen darker, legs and antennæ lighter. Eyes small, distinctly more than their own length from the base, coarsely granulate, not more prominent than the tempora which appear swollen (Fig. 3.). Front flattened between base of antennæ but convex posteriorly. Front and deepest parts of lengthwise grooves coarsely hairy as is also the labrum. Two frontal impressions deepest opposite middle of the eyes, grooves more shallow posteriorly. Third joint of maxillary palpi more swollen than in other species of Orobanus. Antennal joints thicker than in other forms of the genus. First joint cylindrical, less than the length of the second and third combined; second very slightly shorter and stouter than the third; three to six subequal; seven to ten gradually diminishing in length but slightly thickened; eleven less than nine and ten combined. Prothorax wider than long at a point one-third of the distance from the apex; width at base about equal to length and slightly wider than greatest width of the head; sides deeply incurved from widest point to base. Punctures shallow but fairly dense. Base definitely margined. Lateral fovea deepest posterior to widest part of the prothorax. Combined elytra slightly wider than the sutural length, not quite as long as prothorax. Humeri not rounded but oblique. (Fig. 1.). Wing covers separately rounded at apex. Pubescence fairly long, recumbent. First joint of hind tarsus longer than the second but not so long as the second and third combined (Fig. 2.). Length, from anterior margin of prothorax to end of elytral suture, 1.5 mm.; width, 1.2 mm.

Described from two specimens taken by myself under stones on the shore of Lake St. Mary near Sun Camp, Glacier National

Park, Montana. The type is a male collected on July 18, 1924. The second specimen is a female taken in the same locality July 15, 1929.

This differs from the other species of Orobanus in its smaller eyes, more swollen tempora, less prominent humeri, thicker antennal joints, and in having the first joint of the hind tarsus not as long compared with the second and third as in the other species.

Orobanus mormonus Mank, new species

Figures 4-6

Surface alutaceous, pubescence moderate, recumbent. Eyes small, not more prominent than the tempora, distant from base more than their own length (Fig. 6.). Head finely alutaceous and dull, punctulate on front between impressions. Lengthwise impressions extending beyond the ocelli. Antennæ slender; first joint cylindrical, slightly longer than the second; two to four subequal; five to eight gradually shorter in length; nine and ten together greater in length than eleven; eleven decidedly pointed. Third joint of maxillary palpi moderately wide as in *simulator*. Prothorax wider than long, widest at a point slightly more than one-third the distance from the anterior margin, lateral margin sinuate from widest point to the base. Basal margin thickened but not punctured. Humeri not rounded but oblique. (Fig. 4.). Sutural length subequal to the combined width of the elytra at the widest point. Pubescence not as thick as in *simulator*. First joint of hind tarsus longer than two and three combined. (Fig. 5.). Length, from anterior margin of prothorax to the end of elytral suture, 2.0 mm.; width, 1.4 mm.

Described from three specimens from the cabinet of Dr. H. C. Fall. The type is a male bearing the label Ogden Ut. 7.3.

Orobanus mormonus approaches *montanus* in the small size of its eyes and also resembles that species in its oblique humeri. The width of the antennal joints, the maxillary palpi, and the hind tarsal joints resemble *simulator*.

Orobanus falli Mank, new species

Figures 7-9

Color, mahogany brown; surface shiny; pubescence silken, yellowish brown. Eyes somewhat prominent, moderately granulated, distant from base about equal to their own length, more prominent than the tempora (Fig. 7.). Punctures on front between two lengthwise impressions sparse but deep; more numerous in the impressions and between them and the eyes. Surface of head very shiny. Antennæ slender. First joint cylindrical and thickened; second shorter than the following segments but equal to them in

width; three to six subequal; seven to ten slightly wider and gradually diminishing in length; eleventh about equal in length to nine and ten combined. Prothorax distinctly wider than long. Definitely punctured with an irregular row of large punctures anterior to basal margin and extending along the sides to the lateral foveæ. Well rounded humeri. (Fig. 7.). Sutural length greater than the width of the combined elytra. Pubescence long, coarser than in *simulator* and less recumbent. Punctures not as deep as on head, but distinct; distant from one another more than their own diameter. First joint of posterior tarsus fully twice as long as the second and third combined (Fig. 8.). Length, from anterior margin of prothorax to end of elytral suture, 1.9 mm.; width, 1.1 mm.

Described from a pair taken by J. O. Martin in Redwood Park, Contra Costa Co., California, and bearing the label 8-10-18. The type is a male. Both specimens are in Dr. Fall's cabinet.

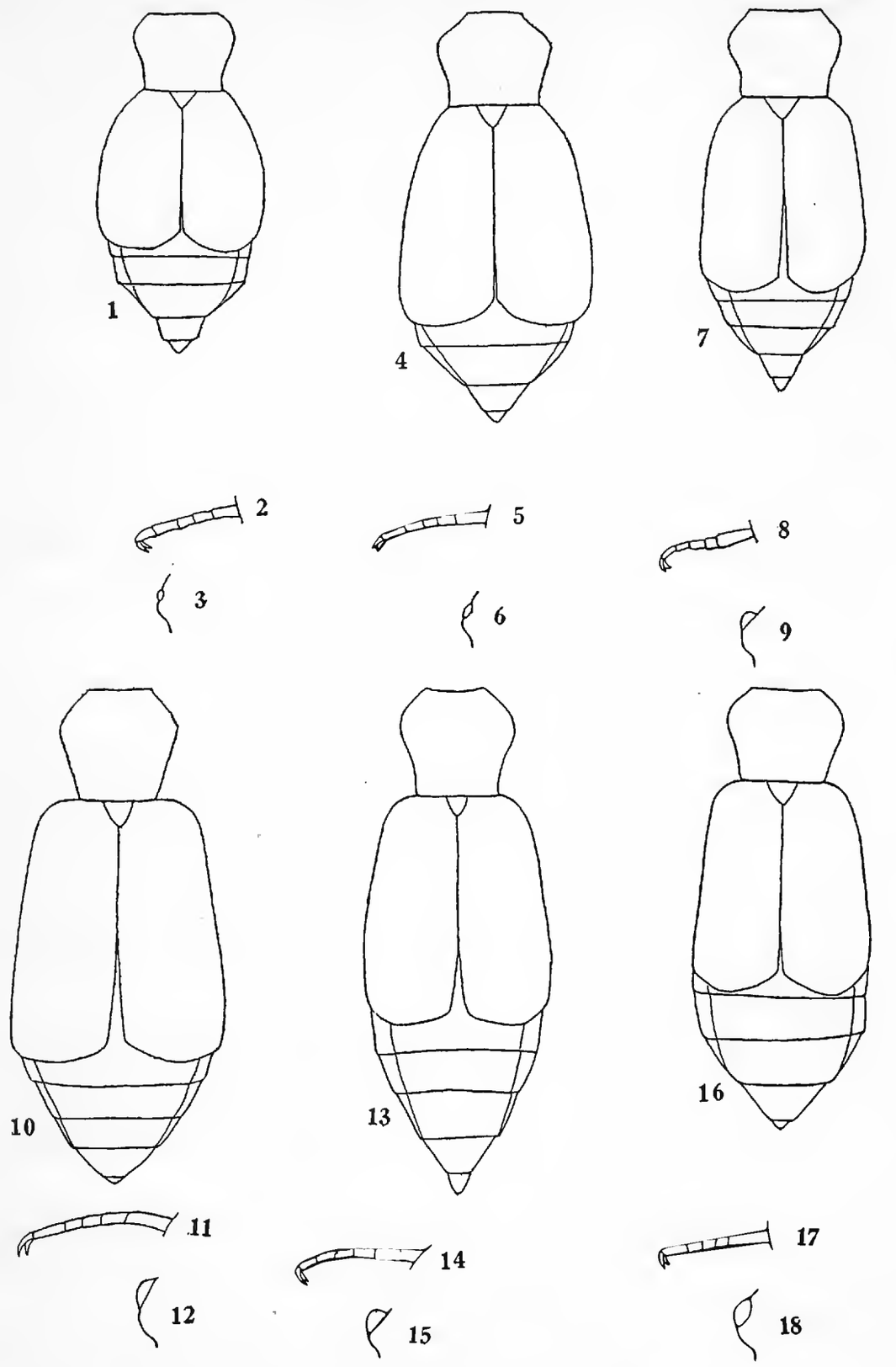
Orobanus falli differs from all other species of Orobanus in its more shiny surface, deeper punctuation, and in the distinct line of punctures along the basal margin of the prothorax.

The following table includes all known species.

A. Eyes small, more than their own length from the base; tempora swollen, humeri oblique.
  b. First joint of hind tarsus less in length than second and third combined; surface punctate....*montanus* n. sp.
  bb. First joint of hind tarsus greater in length than second and third combined; surface alutaceous, minutely punctulate.....*mormonus* n. sp.

AA. Eyes somewhat prominent, hardly more than their own length from base of head; humeri at least moderately prominent; first joint of hind tarsus distinctly longer than the second and third combined.
  b. Surface shining; pubescence sparse; row of large punctures anterior to basal margin of the prothorax.....*falli* n. sp.
  bb. Surface not shining; pubescence at least moderately abundant.
    c. Punctuation and pubescence dense; humeri broadly exposed.....*densus* Clay
    cc. Punctuation and pubescence moderately abundant; humeri broadly exposed.
      d. Sides of thorax more deeply sinuate; form somewhat more slender; legs paler....*rufipes* Csy.
      dd. Sides of thorax less deeply sinuate; legs dark.....*simulator* Lec.

The cut illustrates the general form of each species together with drawings of the hind tarsus and the side of the head.



Figures 1-3 Orobanus montanus
Figures 4-6 Orobanus mormonus
Figures 7-9 Orobanus falli
Figures 10-12 Orobanus densus
Figures 13-15 Orobanus rufipes
Figures 16-18 Orobanus simulator

ON TWO SPECIES OF FALSE SCORPIONS COLLECTED BY BIRDS IN MONTANA, WITH NOTES ON THE GENUS DINOCHEIRUS

(Arachnida—Chelonethida)

BY JOSEPH CONRAD CHAMBERLIN

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Introduction

Through the courtesy of Dr. R. V. Chamberlin of the University of Utah, it has been the writer's privilege to examine a small collection of chelonethids taken from the stomach contents of the nighthawk (*Chordeiles minor*) in Montana. Two species, both of which have been previously undescribed, occur in the collection, representing the families Cheliferidæ and Chernetidæ respectively. In the case of the chernetid (*Pachycheirus instabilis*) an additional specimen was available which was of interest in that it was taken on a cerambycid beetle.

Family CHERNETIDÆ Chamberlin

Pachycheirus Chamberlin, genus nov.

Orthotype. *Pachycheirus instabilis* sp. nov.

Diagnosis. Chernetid closely related to *Dinocheirus*, from which it differs in the chætotaxy of the chela and chelicera, and possibly in the normal number of blades comprising the flagellum.

Pleural membrane stellately granulate (fig. 1, J); all tergites and sternites except the eleventh divided by a broad papillately roughened interscutal stripe; scuta well separated inter-segmentally and inter-scutally, more or less deliquescently merging into the surrounding membranes; posterior tergites somewhat "recurved" around the eleventh segment. Carapace with eye-spots indistinct or absent; with two well defined transverse furrows, both of which are evenly procurved, the anterior furrow nearly median but the posterior furrow lying midway between the anterior furrow and the posterior margin of the carapace. Tergites, carapace, and palps evenly granulate and vestitured by stout denticulate setæ (fig. 1, R and S); tergites uniseriately bordered by 14 to 16 setæ; palps very stout (fig. 1, Y) and probably sexually dimorphic as in *Dinocheirus;* chela with accessory teeth strongly developed interiorly and exteriorly, sense spots abundant, most especially on the interior face of the fixed finger; chætotaxy of fixed finger (fig. 1, X as compared with Q and Z) fundamentally

as in *Dinocheirus* except that IT and IST are somewhat more closely associated than in that genus; chætotaxy of movable finger differing from *Dinocheirus* in that T and ST are relatively more basally situated, with ST at least as near SB as T, which thus stands alone; B and SB closely associated, about two areaolar diameters apart; dental profile of female fingers morphologically modified, being basally crested on the fixed finger and sub-distally excavated on the movable finger (fig. 1, X as compared with Q). Cheliceræ typical in general morphology; chætotaxy normal, seta SB slender and completely simple and acute (fig. 1, V) in which it differs from *Dinocheirus* (fig. 1, T. U, and M); flagellum with either three or four blades (fig. 1, N, O, P, and W), both numbers occur within the single species upon which the genus is founded, the "normal" number not yet definitely known, but very likely four; galea probably sexually dimorphic as in *Dinocheirus;* lamina interior with three dentate sub-apical lobes. Legs normal; coxal area normal; fourth tarsus (fig. 1, F) with a slender acuminate pseudotactile seta placed distinctly distad of median as in *Dinocheirus.* Female genital area as in *Dinocheirus.* Tracheal trunks smoothly striate.

Remarks. Only the orthotype is assigned to this genus for the present but it undoubtedly includes other western American species as well. The characteristics in which the genus differs from *Dinocheirus* are stated briefly in the following couplet.

1. ST as close to SB as to T and situated clearly proximad of median (fig. 1, X); T about as close to finger tip as to ST; sub-basal seta of chelicera simple and acute (fig. 1, Y). Chela of female gaping, the dental contour of the finger plainly morphologically specialized (fig. 1, X) ..*Pachycheirus* genus nov.
— ST much closer to T than SB and situated clearly distad of median; T much closer to ST than finger tip (fig. 1, Q and Z); sub-basal seta of chelicera variously and distinctly dentate (fig. 1, T, U, and M). Female chela not gaping, the dental profile of fingers normal (fig. 1, Q).....*Dinocheirus* Chamberlin

Pachycheirus instabilis Chamberlin, sp. nov.

(Fig. 1, F, J, K, L, N, O, P, R, S, V, W, X, and Y).

Holotype. Female (JC-795.02001); paratypes 3 females, (JC-795.02002-4), all from "the alimentary tract of the nighthawk (*Chordeiles minor*). Collected at Sula, Montana. Labelled "187322, *Chordeiles.*" Submitted for determination by Dr. R. V. Chamberlin. Additional paratype 1 female (JC-637.01001) from a spondylid (Cerambycid) beetle, Florence, Montana, collected June 17, 1916, by H. L. Seamans, studied through the

courtesy of Prof. R. A. Cooley. Only the female of this species is thus far known.

Diagnosis. Eye-spots poorly defined or absent. Carapace longer than broad behind (measurements exclude membranous areas); anterior furrow median and smoothly procurved; posterior furrow mid-way between anterior furrow and posterior margin of carapace, also smoothly procurved. Tergites bordered by 14 to 18 setæ, the median scuta also bearing at least a lateral and a median seta in advance of the normal border series. Sternites with chætotaxy similar to that of tergites except that there are 18 to 22 simple acute setæ in the marginal series; stigmatic plates small and non-setose. Galea of female comprising a slender shaft with six more or less curved simple branches (fig. 1, K); flagellum very variable in structure, with either three or four blades (one specimen JC-795.02002) has one chelicera with a 3-bladed, the other with a 4-bladed, flagellum (fig. 1, O and W) which are variously dentate (figs. 1, N, O, P, and W). Palps robust (fig. 1, X); trochanter with a prominent sub-dorsal conical "heel" 1.50-1.55 times as long as broad; femur strongly pedicellate, scarcely longer than tibia or hand and 2.45 to 2.5 times as long as broad; tibia very slighter shorter than femur and slightly longer than hand, 2.1 times as long as broad; chela more prominently swollen interiorly than exteriorly and 2.1 to 2.2 times as long as broad; hand much longer (as 53 is to 45 or 46) than fingers, shorter than tibia, sub-equal to fourth pedal femur (pars basalis plus pars tibialis), only slightly broader than deep and 1.3 times as long as broad. Fourth pedal femur as long as hand and 3.25 times as long as deep; tibia 3.5 times as long as "broad"; tarsus 4 times as long as broad. Chela as illustrated (fig. 1, X), distinctly but slightly gaping when closed and showing marked modifications of the dental contour; fingers with 33 to 35 marginal teeth each; accessory teeth number 6 or 7 interiorly and about 10 exteriorly on either finger. Sense spots most abundant interiorly on both fingers; fixed finger interiorly with a moderately well defined sub-basal cluster of about a dozen spots, which anteriorly extends forward on the finger in two stragglingly parallel rows as far as IT, about 30 or so spots in all; exteriorly the spots are fewer, arranged as shown in figure (fig. 1, X), and numbering about 5 in all; movable finger with a straggling series of six or seven spots interiorly extending from opposite B to the nodus ramosus of the venom apparatus; exteriorly with two or three spots (fig. 1, X). Chætotaxy of genital area typical, comprising a loose central cluster of a couple of dozen setæ and a border series of about 16; spermathecæ conspicuous and much coiled. Length of adult female 3.5 mm. (potassium hydroxide expanded) to 2.8 mm. (non-expanded); abdominal breadth (non-expanded female) 1.35 mm. Length of chela 1.28 mm.

Remarks. It is unfortunate that no male of this species has been available for study. It is almost certain, however, that the palpal proportions will be reasonably close to those described for the female except for the chela, which will in all probability be much heavier (as in *Dinocheirus*). The variable morphology of the flagellum is unique and the apparent instability of this character for this species must be considered in employing this organ for the definition of generic and tribal groups.

In one specimen, an abnormal galea (fig. 1, L) occurs in which the branching tip is strongly deformed. It is still 6-branched as in the normal galea (fig. 1, K).

DINOCHEIRUS Chamberlin

(Fig. 1, D, E, G, M, Q, T, U, and Z)

1929. *Dinocheirus* Chamberlin, Pan Pacific Entomologist 5; p. 171.
1931. *Dinocheirus* Chamberlin, The Arachnid Order Chelonethida (Stanford University Press); p. 242, figs. 16, H, P; 18, K, L; 20, H; 30, H, I.
1932. *Dinocheirus* Chamberlin, Beier, Zool. Jahrb. Syst. 63; (in press)
1932. *Epaphochernes* Beier, t.c. (in press)

Remarks. Through some oversight the flagellum of *Dinocheirus* was not noted in the original characterization of this genus (Chamberlin, 1929). Later, however, (Chamberlin, 1931, p. 73 fig. 16-H), it was figured in connection with another study. It is definitely 4-bladed and consequently the genus falls into Beier's *Hesperochernetini* and not his *Chernetini* as indicated by him (t. c.) *Chelanops arizonensis* Banks, the orthotype of Beier's *Epaphochernes* (tribe *Hesperochernetini*), is without question congeneric with *Dinocheirus tenoch*, the type of *Dinocheirus*, and in consequence Epaphochernes necessarily falls as a synonym of *Dinocheirus.* Some additional figures of *Dinocheirus tenoch* and *Dinocheirus arizonensis* are given herewith in order to facilitate a comparison of the genera *Dinocheirus* and *Pachycheirus* genus nov. See discussion under *Pachycheirus.*

CHELIFERIDÆ Hagen

PARACHELIFER Chamberlin

1931-32. *Parachelifer* Chamberlin, Canadian Entomologist, 64; p. 19.

Diagnosis (emended). *Male.* Coxal spurs pronounced. Coxal sacs typical of the subfamily. Genital structure typical of subfamily. Tergal crests pronounced; fore tarsus (fig. 1, H and L) strongly modified, definitely swollen proximad of the pronounced tarsal spine; claws strongly asymmetrical, one only slightly distorted and simple, the other strongly distorted and with a single, well developed, dorsal spur or tooth (fig. 1, I). Galea stylet-like.

Female. Genital operculum and cribriform plates typical of subfamily. Galea branched.

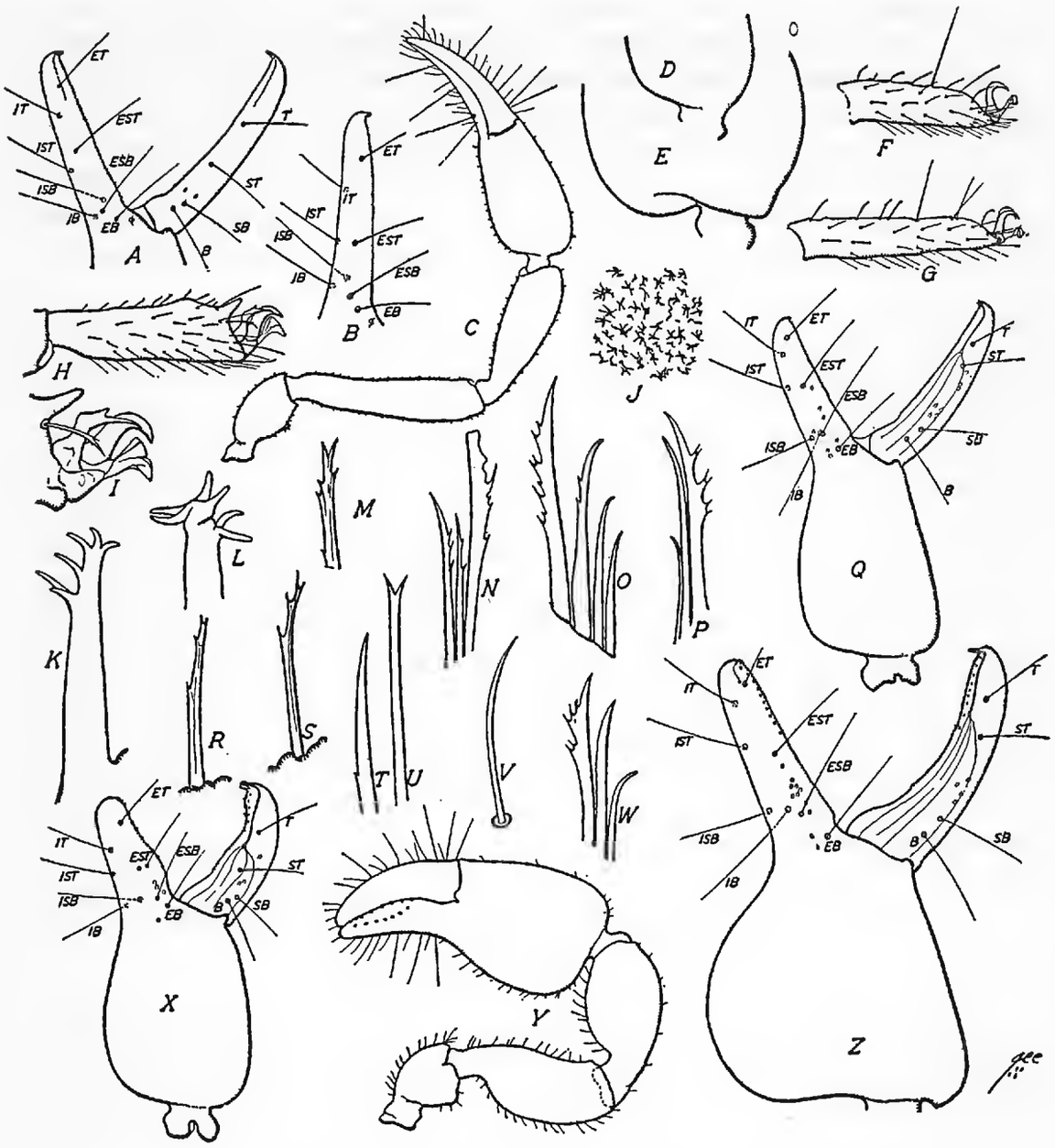
Both sexes. Tarsal claws each with a distant ventral spur (bifid); tarsal subterminal, setæ dentate (fig. 1, I). Sub-basal and basal setæ of chelicera both present, short, and generally at least apically denticulate. Carapace with eyes; both carapacal furrows distant, the anterior one sub-median in position, the posterior one a tergal length anterior to the posterior margin; carapace broader than long. All tergites and sternites longitudinally divided by a linear suture. Carapace and palps evenly granulate, frequently (usually) with larger setose tubercles. Tergites and sternites squamotessellate; uniseriately setose. Vestitural setæ of palps, carapace, and tergites very short, stout, semiclavate, and terminally more or less denticulate. Chætotaxy of chela as shown in fig. 1, A. Pleural membrane finely plicate (longitudinally striate), the striæ not smoothly parallel. General facies typically cheliferoid.

Parachelifer montanus Chamberlin, sp. nov.

(Fig. 1, A, B, C, H, and I).

Holotype, male (JC-795.01001); paratype, male (JC-795.-01002) both from the alimentary tract of the nighthawk, from Sula, Montana. The collection bears the additional label "187322-*Chordeiles*." Submitted for determination by Dr. R. V. Chamberlin.

Diagnosis. Typical *Parachelifer* closely related to *persimilis* (Banks). Subterminal setæ (fig. 1, I) strongly curved distally and with the dorsal tooth much better developed than the ventral one, which may indeed be apparently lacking, in some cases even on the same specimen; larger tubercles of carapace and palps much reduced in size and few in number, practically vestigial (fig. 1, C); carapace and first ten tergites of male with distant tergal crests which become progressively reduced posteriorly; tergites bordered by 12 to 14 setæ exclusive of those developed upon the tergal spurs; basal and sub-basal setæ of chelicera very obscurely denticulate or possibly even acuminate; anterior stigmatic plate non-setose; posterior plate with a single seta. Carapace distinctly broader behind than long. Chætotaxy of chela (fig. 1, A and B)



DESCRIPTION OF FIGURE

Parachelifer montanus sp. nov. A, extero-lateral aspect of right chela (male paratype); B, extero-lateral aspect of fixed finger of right chela, (holotype); C, ventral aspect of left palp. H, fore-tarsus of male (holotype); I, same, details of claws, etc.

Dinocheirus arizonensis (Banks). D, E, dorsal aspects of base of hand of chela (same scale) showing relative difference in size of female and male chela respectively. Q, exterior lateral aspect of right female chela (same scale as fig. Z); T and U, two different aspects of sub-basal seta of chelicera; Z, exterio-lateral aspect of right chela of male (same scale as fig. Q).

Dinocheirus tenoch Chamberlin. G, fourth tarsus of male specimen showing position and nature of pseudotactile seta; M, tip of sub-basal seta of chelicera.

fundamentally as in the genus but showing some variants; B and SB of movable fingers sub-adjacent, not more than two areolar diameters apart; T opposite nodus ramosus; EST nearly or quite opposite IST (the two specimens vary in this, compare fig. 1, F and B), at most only two areolar diameters anterior thereto; ISB and IB obliquely opposite, with IB proximad of ISB; ESB more or less proximad of IB; movable finger with 48, fixed finger with 43, marginal teeth, the more basal ones of which are nearly obsolete and can be counted with certainty only by reason of the persistent dental canals. Palps (fig. 1, C) relatively robust, trochanter 1.95 times as long as broad; femur longer than carapace and 4.5 times as long as broad; tibia longer than hand and subequal to (very slightly shorter than) carapace and 3.3 times as long as broad; chela 3.4 times as long as broad; fingers very slightly shorter than (subequal to) hand, which is slightly broader than deep; fourth pedal femur (pars basalis plus pars tibialis) slightly longer than palpal hand but shorter than tibia and 3.1 to 3.2 times as long as deep; fourth pedal tibia 5.5 to 5.6 times as long as broad; swollen fore-tarsus of male (fig. 1, H) 3.2 to 3.5 times as long as broad. Length of adult male about 3.2 mm., greatest abdominal breadth about 1.7 mm. (potassium hydroxide treated). Palpal femur 1.2 mm. long.

Remarks. This form is most readily separable from *persimilis* (Banks), its nearest congener, by the stouter palpal proportions. The two are compared in the following couplet. It is drawn up upon the basis of males of the two species only. I have examined two male specimens (JC-221.01001 and 2) of *persimilis* from New Mexico through the courtesy of Dr. R. V. Chamberlin, then of the Museum of Comparative Zoology at Cambridge.

Pachycheirus instabilis genus et species nov. All drawings from female. F, fourth tarsus showing pseudotactile seta; J, detail of pleural membrane showing stellate wrinkles; K, normal galea (JC-795.02003); L, abnormal galea (JC-795.02002); N, O, P, and W, flagella drawn from various specimens (JC-795.02003), left chelicera: (JC-795.02002), left chelicera; (JC-795.02001), left chelicera; and (JC-795.02002) right chelicera, respectively) showing some of the variations in this structure as they occur in this species; R and S, vestitural setæ from the dorsum of the fourth femur and tibia respectively; V, sub-basal seta of chelicera; X, extero-lateral aspect of right chela; Y, ventral aspect of left palp.

1. B and SB of movable finger sub-adjacent, not more than two areolar diameters apart; ISB and IB obliquely opposite and clearly more or less anterior to ESB; EST transversely to obliquely paired with IST and not more than two areolar diameters distad thereof (fig. 1, A and B); movable finger with 48, and fixed finger with 43, marginal teeth; palps relatively robust, femur 4.5, tibia 3.3, and chela 3.4 times as long as broad respectively; hand and fingers subequal in length, with hand tending to be slightly the longest....*montanus* sp. nov.
— B and SB not closely associated, about four areolar diameters apart; ISB and IB transversely opposite each other and directly opposite ESB; EST well anterior of IST (about four areolar diameters); movable finger with 57, fixed finger with 53, marginal teeth; palps relatively slender, femur 5.2 to 5.4, tibia 3.8, and chela 3.9 to 4.0 times as long as broad; fingers slightly but distinctly longer than hand.....*persimilis* (Banks)

ANTS FROM THE ISLANDS OFF THE WEST COAST OF LOWER CALIFORNIA AND MEXICO

BY WILLIAM MORTON WHEELER

The following paper deals with a small but important collection of Formicidæ made by Mr. H. H. Keifer in 1925 on Guadalupe, Cedros, San Martin and Isabel Islands, and the Tres Marias and Revillagigedo archipelagos during the 1932 expedition of the California Academy of Sciences. The collection comprises 28 forms, including eight which were previously undescribed. All belong to well-known Mexican genera and, like those of the Galapagos Islands and Cocos Island, recorded in previous papers, are members of the neotropical fauna, excepting *Aphænogaster patruelis* and *Camponotus keiferi* from Guadalupe Island, which are more closely related to certain nearctic or palearctic species (*Aphænogaster subterranea* and *Camponotus castaneus*). Some of the insular forms are sufficiently different from their nearest continental allies to reveal a certain amount of endemicity, which on further exploration may prove to be greater than our present knowledge indicates.

Lower California

Aphænogaster patruelis Forel.

Numerous workers and two males taken on the north end of Guadalupe Island (IV.20.'25) may be regarded as topotypes of the typical forms of this ant.

The male (undescribed) measures about 3.5 mm. Head through the eyes slightly wider than long, broadly rounded behind, with very short cheeks. Mandibles well-developed, 6-toothed. Antennal scapes nearly four times as long as broad; funiculi long, the four terminal joints elongate, each constricted at its base and, with the exception of the terminal joint, also at its apex. Thorax long, through the wing-insertions broader than the head; mesonotum large, subhexagonal, as broad as long, anteriorly very convex and projecting, depressed posteriorly just in front of the scutellum; epinotum small, low and narrow, in profile with long, medially somewhat concave base and short, abrupt declivity, the two surfaces meeting at a right-angle. Petiole and postpetiole much as in the worker, but the nodes lower and more rounded. Gaster like that of the worker; legs more slender; hind tibiæ slightly bent near the base. Sculpture and color as in the worker, but the body darker, nearly black; pilosity even less developed. Wings slightly brownish; veins brown; pterostigma dark brown.

The subsp. *willowsi* Wheeler (1933), from San Nicolas Island, one of the Santa Barbara Islands, California, differs from the typical *patruelis* only in the less convex base of the epinotum, less developed sculpture and somewhat paler coloration.

I have recently examined Pergande's specimens of the subsp. *carbonaria* from Sierra Laguna (type-locality) and El Chinche, Lower California. The worker differs from the typical *patruelis* in somewhat larger size and in having decidedly longer antennal scapes and funicular joints and the base of the epinotum less convex, with a pair of short ridges at the posterior end, terminating in sharp angles instead of acute denticles as in the typical form. Both petiolar and postpetiolar nodes are higher and more conical, the color is darker, the body being black and less reddish, and the legs and scapes darker brown; the hairs on the appendages, especially on the flexor surfaces of the femora and tibiæ are much more developed; the frontal area is sharply carinulate in the middle, the head more abundantly rugulose and the clypeus and mandibles more coarsely rugose.

Among the Pergande specimens there is an undescribed, deälated female from El Chinche, which has lost its abdomen. The thorax is scarcely wider through the wing-insertions than the head through the eyes, and is shaped much as in the male of *patruelis sens. str.*, but the epinotum bears two large, stout spines, which are somewhat longer than broad at their bases. Head coarsely rugose throughout, the rugæ longitudinal on the clypeus and cheeks but strongly and sinuously diverging on the front and curving outward to the rounded posterior corners of the head, where they are

joined by rugæ diverging from between the lateral ocelli. Pronotum transversely, sides of epinotum longitudinally, its base and declivity transversely and sharply, rugose; mesonotum smooth and shining, with a few fine converging rugules at its posterior end; scapes and legs with sparse piligerous punctures. Color and pilosity as in the worker.

Carbonaria, originally described as a species was reduced to subspecific rank by Forel (1899), but it and *patruelis* may eventually prove to be specifically distinct.

PHEIDOLE HYATTI Emery

Five soldiers, two workers and a deälated female from San Martin Island (VI. 8. 1925). This species is common in Southern California.

SOLENOPSIS GEMINATA Fabr.
subsp. MANIOSA Wheeler

A single worker from Cedros Island. This is the common form of *geminata* in Southern California.

Leptothorax (Goniothorax) peninsularis Wheeler, sp. nov.

Female. Length about 5 mm.

Head subrectangular, slightly longer than broad, nearly as wide anteriorly as posteriorly, with rounded posterior corners and straight posterior border. Eyes convex, at the middle of the sides. Mandibles small, with straight external borders and about six small teeth. Clypeus convex, its anterior border straight and transverse in the middle, sinuate on each side. Antennæ 12-jointed; scapes reaching somewhat beyond the posterior corners of the head; funiculi with joints 2 to 6 as long as broad, remaining joints longer than broad, the last three forming a distinct club, with the basal two joints subequal and together as long as the terminal joint. Thorax large and robust, broader than the head; pronotum with prominent, rectangular but not acute humeri; mesonotum and scutellum flattened above, the former subhexagonal, very nearly as broad as long; epinotum with somewhat convex base, shorter than the perpendicular declivity; spines large and stout, acute, longer than their basal diameter, but shorter than their distance apart. Petiole with well-developed peduncle and stout anteroventral tooth; node subcuboidal, slightly broader than long, its laterosuperior border distinctly denticulate anteriorly; postpetiole much

broader than the petiolar node, from above transversely rectangular, nearly twice as broad as long, its posterior border emarginate in the middle. Gaster large, elliptical, with straight anterior border. Wings with large pterostigma, small discoidal cell and very short, closed marginal cell.

Subopaque; venter smooth and shining; mandibles very finely striate; clypeus and head longitudinally and rather finely rugulose, the rugules becoming more reticulate laterally and posteriorly. Pronotum, mesonotum and scutellum evenly rugulose and glossy, the rugules on the pronotum transverse anteriorly, longitudinal on the sides and on the mesonotum and scutellum; remainder of thorax finely punctate-rugulose; the epinotal declivity anteriorly and posteriorly very finely and transversely rugulose. Gaster above and appendages very finely and densely punctulate; bases of the second and following gastric segments smooth and shining.

Hairs pale yellowish; numerous, obtuse and very short on the head and thoracic dorsum, somewhat longer on the gaster. Scapes and legs with very fine, short, appressed pubescence.

Ferruginous; mandibles, clypeus, cheeks, sutures of thorax and legs brownish yellow; ocellar area fuscous; wings faintly tinged with yellow; veins brown; pterostigma darker brown, especially along its posterior border.

Two specimens taken at Magdalena Bay, Lower California (V.30.'25). They are much larger than any of the other Goniothorax females I have seen. I have described them without the workers because they can be very readily recognized. At first sight they seem to be referable to the genus Macromischa, which is very closely related to Leptothorax. The shape of the marginal cell is characteristic and exactly like that of the North African *L. rottenbergi* Emery, which belongs to a group in certain respects intermediate between Leptothorax and Macromischa. The worker of *peninsularis*, when discovered, will probably be found to resemble the Brazilian *L. sculptiventris* Mayr, which might be placed in the genus Macromischa.

CREMATOGASTER (ACROCŒLIA) LINEOLATA Say subsp. CALIFORNICA Emery

I refer five workers from Magdalena Bay, Lower California (V.30.'25) and a dozen from San Martin Island (VI.8.'25) to this form. They agree closely with Emery's brief description of specimens from Encenitas and Los Angeles, California. He says

that *californica* combines the robust stature of the subsp. *læviuscula* Mayr with a very aberrant sculpture like that of the subsp. *coarctata* Mayr. "The head is opaque, only the front being somewhat shining but otherwise with dense, longitudinally confluent punctuation. Thorax and pedicel entirely opaque, very densely punctate, only the declivity of the epinotum shining, its base coarsely, irregularly and longtitudinally striate. Pubescence of the tibiæ and scapes as in *læviuscula*."

On examining the Crematogaster material from various Californian localities in my collection, I find considerable variation in all the characters mentioned by Emery. The status of *californica*, which he regarded as a variety of *læviuscula*, must therefore remain in doubt till a special study of a large amount of material from numerous localities can be undertaken. I regard it provisionally as a variable subspecies of *lineolata*.

The specimens from Magdalena Bay seem to be almost typical *californica*. The antennal scapes are shorter than in *coarctata*, the epinotal spines long, divergent and feebly sinuous, but the sculpture of the head is variable and the epinotal declivity either smooth and shining or opaque and densely punctulate. The pubescence of the scapes and tibiæ is abundant, oblique and as long as in the subsp. *læviuscula*, but shorter than in our Eastern subsp. *pilosa* Pergande. The appressed pubescence on the head and gaster is conspicuously long. The base of the gaster is reddish brown like the thorax.

The specimens from San Martin Island average smaller and have shorter, straight, epinotal spines and the petiole is distinctly broader than long, the gaster in most individuals black throughout, the legs darker than in the series from Magdalena Bay.

Crematogaster (Acrocœlia) lineolata subsp. cedrosensis Wheeler, subsp. nov.

Worker. Length 3-3.5 mm.

Related to the subsp. *læviuscula*, but differing as follows: Smaller and less robust, with smaller head and narrower thorax, the mesoëpinotal constriction less pronounced both dorsally and laterally; the carina on the mesonotum shorter, very prominent and often tooth-like in profile; epinotal spines much shorter, not longer than the base of the epinotum, very thin and acute, straight and

much less diverging posteriorly; petiole narrower, trapezoidal, less cordate anteriorly. Smoother and more shining than *læviuscula*, but cheeks and clypeus more sharply longitudinally rugulose, petiole subopaque and finely punctate. Pubescence on scapes and legs less abundant, finer and appressed. Color much darker, being castaneous brown, with darker head; antennal clubs and gaster, except at the base, black; legs slightly paler brown than the thorax.

Eight specimens from Cedros Island (VI.5.'95).

Camponotus (Camponotus) keiferi Wheeler, sp. nov.

Worker major. Length 7-8 mm.

Head rather small, subtrapezoidal, longer than broad, narrowed anteriorly, with straight sides and feebly and broadly excavated posterior border. Eyes moderately large and convex. Mandibles stout and convex, 6-toothed. Clypeus subcarinate at the base, its anterior border neither lobed nor produced, slightly emarginate in the middle. Frontal area small, transversely trapezoidal, frontal groove distinct; frontal carinæ sigmoidal. Antennal scapes extending nearly two-fifths of their length beyond the posterior corners of the head, slender and feebly flattened but not dilated at the base. Thorax of the usual shape, the pronotum, mesonotum and base of the epinotum forming an even curve in profile; pronotum flattened above, anteriorly semicircular, submarginate at the sides; metanotal sclerite distinct, bounded by a suture posteriorly; epinotum strongly compressed laterally, in profile with the base straight and rather strongly sloping, forming a distinct obtuse angle with the slightly shorter, perpendicular and somewhat concave declivity. Petiolar scale rather broad, convex both anteriorly and posteriorly, the superior border not very acute, from behind feebly convex as are also the lateral borders. Legs moderately long, fore femora enlarged; hind tibiæ somewhat flattened but not grooved, their flexor surfaces without bristles.

Smooth and shining, microscopically shagreened and with small, sparse, piligerous punctures; anterior portion of head less shining and distinctly though minutely and densely punctulate, clypeus and adjacent portions of cheeks also with sparse piligerous foveolæ, the more posterior portions of cheeks with small, non-piligerous punctures. Mandibles sharply punctate; antennal scapes subopaque, finely punctulate.

Hairs golden yellow, moderately long, very sparse, erect, absent on the scapes and legs, except at tips of femora. Pubescence undeveloped, except on the tibiæ, where it is extremely fine and appressed.

Brownish yellow; gaster brown above; head, mandibles and scapes castaneous; funiculi red; mandibular teeth black; coxæ, femora and palpi yellow; knees, tibiæ and tarsi somewhat darker and more reddish; posterior borders of gastric segments yellowish.

Worker minor. Length 5.5-6 mm.

Very similar to the major, except in having the head smaller and narrower, though with anteriorly converging sides, with straight posterior border, larger and more convex eyes, more convex and more distinctly subcarinate clypeus, proportionally longer antennal scapes, less sigmoidal frontal carinæ. Pilosity, sculpture and color as in the major, but the head is more shining anteriorly, with less distinct punctures, the gaster darker brown.

Described from four major and two minor workers taken on the south end of Guadalupe Island (IV.20.'25).

This form closely resembles the typical *C. castaneus* Latr. of our Eastern States but is quite distinct, being much smaller, with a narrower head, distinct metanotal sclerite in the major worker, a much more acute petiole, no bristles on the flexor surfaces of the hind and middle tibiæ, etc.

CAMPONOTUS (MYRMOBRACHYS) PHYTOPHILUS Wheeler (MS)

Two minor workers from Magdalena Bay (V.30.'25). I have recently described this species from Cuernavaca, Mexico.

ISABEL ISLAND, SINALOA

PSEUDOMYRMA PALLIDA F. Smith

Six workers (V.24.25) of rather small dimensions.

MONOMORIUM PHARAONIS L.

Numerous workers and a single deälated female (V.24.'25).

CREMATOGASTER (ORTHOCREMA) BREVISPINOSA Mayr
subsp. MINUTIOR Forel.

Six workers (V.24.'25).

CAMPONOTUS (MYRMOTHRIX) ABDOMINALIS Fabr.
subsp. ESURIENS F. Smith

The female and male taken by Mr. M. Willows, also on Isabel Island (III.27.'32) and mentioned in my former paper (1933) probably belong to this species.

TRES MARIAS ISLANDS

ODONTOMACHUS HÆMATODA L. subsp. INSULARIS Guérin

Seven workers from the village on Maria Madre Island (V.21.'25) are very similar to the common form of this ant from Florida and the West Indies.

PSEUDOMYRMA GRACILIS Fabr. var. MEXICANA Roger

A single worker from the village on Maria Madre Island (V.21.'25).

PSEUDOMYRMA PALLIDA F. Smith

A single worker from the village on Maria Madre Island (V.16.'25).

PSEUDOMYRMA ELONGATA Mayr

A worker and a deälated female from Maria Madre Island (V.20.'25) agree closely with specimens from Florida and the West Indies but are decidedly smaller. They may, therefore, represent a distinct subspecies.

PSEUDOMYRMA SUBTILISSIMA Emery

Two workers from the village on Maria Madre Island (V.-15.'25).

CREMATOGASTER (ACROCŒLIA) OPACA Mayr

A worker and a deälated female from Maria Madre Island.

Numerous workers from the village on Maria Magdalena Island (V.21.'25). These specimens vary greatly in size, from 2.6 to 4.5 mm. Mayr's type was intermediate, measuring 3.5 mm. The well-developed epinotal spines in the specimens before me are strongly divergent, straight or somewhat incurved, but not subparallel as described by Mayr. The frontal area is larger and surrounded by more pronounced sutures than in the various subspecies of *C. lineolata* and the mesonotum is not carinate. There can be no doubt that *opaca* is a valid species and not a subspecies of *lineolata.*

CREMATOGASTER (ORTHOCREMA) SCULPTURATA Perg. subsp. PHYTOECA Wheeler (MS)

Four workers from Maria Magdalena Island (V.20.'25) and one from Maria Madre Island (V.21.'25). I have recently described this ant from Mirador, Vera Cruz, Mexico.

Cryptocerus pilosus Emery subsp. **insularis** Wheeler, subsp. nov.

Worker minor. Length 4.3 mm.

Differing from the typical *pilosus* in having the three lateral teeth of the pronotum longer and more acute, the mesonotum neither projecting nor angulate on the sides, the pair of lateral teeth of the epinotum developed as short acute spines, the lateral backwardly directed spines of the petiole and postpetiole more slender and more unequal in length, and the anterior border of the gaster at the articulation of the postpetiole less concave and without angular projections and pale spots. The basal third of the gaster is finely, regularly, longitudinally striate.

A single specimen from Maria Madre Island (V.21.'25).

The type of the species which I know only from Emery's description and figures, is recorded from Paraguay, but I have specimens of a closely related form taken by Dr. W. M. Mann in Brazil. The precise rank of *insularis* cannot be decided till the soldier has been secured.

ATTA MEXICANA F. Smith

A number of media and minor workers from the village on Maria Madre Island (V.21.'25).

CAMPONOTUS (MYRMOTHRIX) ABDOMINALIS Fabr.
subsp. ESURIENS F. Smith

Several major and minor workers from Maria Magdalena Island (V.20.'25).

Camponotus (Myrmepomis) sericeiventris Guérin
subsp. **imperator** subsp. nov.

Worker media. Length nearly 10 mm.

Resembling the subsp. *rex* Forel in pilosity and pubescence, but the pelisse of golden pile on the gaster is somewhat less brilliant and shows no tendency to converge towards the mid-dorsal line. The erect hairs on the head, thorax and gaster are much shorter and less numerous. The humeral spines of the pronotum are more slender and more acute, the superior border of the petiolar scale sharper in profile and straight and transverse from behind. The coloration is quite unlike that of any of the other forms of this widely distributed neotropical ant, being red,

with the sides of the pronotum, the fore coxæ, meso- and epinotum blackish, the extensor halves of the middle and hind tibiæ deeper red.

A single specimen from Maria Magdalena Island (V.20.'25). The peculiar coloration cannot be due to immaturity.

CAMPONOTUS (MYRMOCLADŒCUS) RECTANGULARIS Emery var. AULICUS Wheeler

Three workers from the village on Maria Magdalena Island (V.21.'25). Originally described from Guatemala (33).

REVILLAGIGEDO ISLANDS

Odontomachus hæmatoda L. subsp. **clarionensis** Wheeler, subsp. nov.

Worker. Length about 9 mm.

Resembling the subsp. *coninodis* Wheeler of Arizona in the shape of the petiolar node, which has a very short, stout apical spine, but of larger stature and with a proportionally much larger and broader head. Posterior corners of the latter smooth and shining; striæ on pronotum concentric in the middle, transverse anteriorly and posteriorly and longitudinal on the sides. Pubescence on the thorax, petiole, gaster and legs long and conspicuous. Head, antennæ, thorax and petiole deep red, darker than in the subspecies *clara* Roger and *coninodis* but paler and less brownish than in the typical *hæmatoda*; gaster black; legs testaceous.

Three specimens from Clarion Island (IV.26.'25).

SOLENOPSIS GEMINATA Fabr.

A single small worker from Clarion Island (VI.26.'25). Mr. M. Willows took specimens of this same form on the same island (III.24.32) and also on Socorro Island (III.7.32).

Forelius fœtidus Buckley subsp. **keiferi** subsp. nov.

Worker. Length 2.3—2.5 mm.

Differing from the typical form of *fœtidus* from Texas in the following characters: Color somewhat deeper and more reddish, with the legs paler, yellowish, and the last gastric segment fuscous. Head broader behind, distinctly narrowed anteriorly, posterior border somewhat more excavated; antennal scapes and legs longer, the former reaching one-fourth their length beyond the posterior

border (in the typical form only one-fifth); mesoëpinotal impression in profile deeper and more acute, epinotum more convex, evenly rounded, without distinct base and declivity; superior border of petiolar scale with a much less acute median point; tibiæ without fine oblique hairs.

Female. Length 5—5.5 mm.

Differing from the typical form in the somewhat longer and more anteriorly narrowed mesonotum, the absence of black spots at the insertions of the fore wings, much less sharply bounded dark fasciæ on the gaster, paler wing veins and absence of oblique hairs on the legs.

Male. Length about 1.8 mm.

Like the typical *fœtidus* but the head, thorax and appendages paler brown, the veins and pterostigma of the wings colorless and the scapes and legs without oblique hairs.

Described from numerous workers and four males from Grayson Cove, (V.2.25) and numerous females from Braithwaite Bay, Socorro Island (V.10.'25).

Iridomyrmex pruinosus Roger var. anale Ern. André

Numerous workers from San Benedicto Island (V.12.'25). These agree closely with typical specimens from Northern Mexico, Texas, Arizona and California.

(Camponotus (Tanæmyrmex) picipes Olivier

A dozen minor workers from Clarion Island (IV.26.'25). Minor workers of the same form were later taken by Mr. M. Willows (III.7.32) on Socorro Island, as recorded in my former paper (1933). Since the tibiæ and tarsi of both series of specimens are paler than in the typical Mexican form in my collection, they may represent a distinct variety.

Camponotus (Myrmobrachys) socorroënsis Wheeler, sp. nov.

Worker major. Length 5—5.2 mm.

Closely related to *brevis* Forel and *mina* Forel. Head moderately large, subtrapezoidal, slightly longer than broad, the posterior border nearly straight, the sides feebly rounded behind, more convex in the region of the cheeks. Mandibles stout, very convex, 6-toothed. Clypeus subrectangular, slightly longer than broad, evenly convex but not carinate in the middle. Frontal area distinct, very small, transversely trapezoidal; frontal carinæ closely approximated in front, strongly sinuate and widely divergent posteriorly; frontal groove distinct. Eyes rather large

and convex, as long as their distance from the posterior border of the head. Antennæ slender; scapes curved, extending only a distance equal to their greatest diameter beyond the posterior corners of the head. Thorax short, shaped much as in *brevis* but decidedly lower and less strongly arcuate above in profile; pronotum depressed, distinctly narrowed anteriorly and nearly as long as broad, the humeri broadly rounded, submarginate. Mesonotum trapezoidal, somewhat broader than long; epinotum small and narrow, in profile with subequal base and declivity, the former straight and sloping, forming a distinct obtuse angle with the more abrupt, slightly concave declivity. Petiolar scale thick, twice as high as long, nearly as thick above as below, with flat posterior surface, the anterior surface flat below, very convex above; seen from behind the superior border is broadly rounded, the sides straight and converging ventrally. Gaster elongate-elliptical. Legs rather short.

Mandibles, gula, posterior corners of head, coxæ and legs distinctly shining; dorsal surface of head and thorax subopaque; petiole and gaster lustrous. Mandibles finely and superficially shagreened and sparsely punctate; head and thorax finely and densely punctulate, the clypeus and cheeks also with sparse, piligerous foveolæ, which on the occiput and pronotum are replaced by sparse, coarse punctures. Gaster finely and transversely shagreened or striolate, with numerous transverse, piligerous punctures. Legs more finely shagreened than the gaster, sparsely punctate.

Hairs glistening white, erect, rather coarse, abundant and moderately long on the dorsal surface of the head, thorax, petiole and gaster; longest on the epinotum, absent on the pleuræ; on the clypeus and cheeks short, stiff and obtuse, on the legs short and obtuse, much more numerous on the tibiæ than on the femora. Antennæ with dilute, appressed pubescence, tips of scapes with a few short hairs.

Black; mandibles, antennæ and anterior third of head, including the mandibles, red; gula and fore coxæ castaneous; legs more yellowish or testaceous, terminal funicular joints and the last joint of each tarsus fuscous; mandibular teeth black.

Worker minor. Length 3.3—3.5 mm.

Very similar to the worker major, but the head much smaller and narrower, with slightly convex posterior border, more convex and more posteriorly situated eyes. Mandibles much narrower and less convex. Clypeus broader, but ecarinate as in the major. Antennal scapes nearly straight, extending half their length beyond the posterior corners of the head. Thorax like that of the major but even lower and less arcuate; pronotum semicircular, not narrowed anteriorly, distinctly marginate at the sides; base of epinotum decidedly longer than the declivity. Petiole similar to that of the major, gaster proportionally shorter.

Sculpture, pilosity and color as in the major, but the clypeus and posterior portions of the cheeks darker and more brownish, as are also the bases of the femora and the antennal funiculi beyond the first joint. Foveolæ on the clypeus and cheeks fewer and less conspicuous.

Male. Length 3.5—4 mm.

Very similar to the male of *brevis* in structure, sculpture, pilosity and color but slightly smaller and with somewhat longer antennal scapes, more strongly carinate clypeus, much narrower mesonotum and longer and more convex epinotum.

Described from five major workers, ten minor workers and twelve males taken at Grayson Cove, Socorro Island (V.4.'25).

At first sight this ant might be regarded as a small and depauperate form of *C. mina*, but it evidently represents a distinct species. The major worker can be readily distinguished from that of *mina* by the shorter antennal scapes, ecarinate clypeus, much more diverging frontal carinæ, anteriorly narrowed pronotum, finer sculpture, etc.

Editorial Notes

The entomologist of the San Francisco area have been busy as usual the past summer. Dr. E. C. Van Dyke spent three weeks in June, with his students from the University of California, collecting in the mountains about Carville, Trinity County, California, with most satisfactory results. Later he and Mrs. Van Dyke drove north through Modoc County to Klamath Falls, Oregon, returning by way of Grants Pass and the Redwood Highway. On this trip he found conditions too dry for best results. Dr. F. E. Blaisdell spent three weeks collecting about Bass Lake, Madera County, California, where he secured some interesting things notwithstanding the dry conditions. Your editor spent July on a collecting trip to Carson City, Nevada, going by way of Sonora and the Mother Lode Highway to Auburn and Truckee, with a side trip to Mono Lake, returning by way of Susanville, Mt. Lassen and Red Bluff to Grants Pass and home by the Redwood Highway. On this trip he was fortunate in having Mr. Geo. P. Engelhardt as a companion. The best collecting was found on Mt. Lassen, elsewhere the dry conditions and the cold winds in Nevada interfered much with collecting. However some interesting Hymenoptera and Diptera were secured at the exact locality where Carl F. Baker took his "Ormsby Co." types thirty years ago.

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INSECTS ON RUTACEOUS TREES NATIVE TO SUBTROPICAL AUSTRALIA

BY S. E. FLANDERS

Citrus Experiment Station, Riverside, California

During the year 1931, an unsuccessful attempt was made to locate the native habitat of the citrus pest, *Coccus pseudomagnoliarum Kuw.*, through a careful examination of such native Australian trees as are included in the citrus family. Available literature records these trees as hosts for five species of insects. In the course of this inspection, however, many insects of considerable interest were discovered, a number of which were new to science. The search was made in New South Wales and Queensland, between latitudes 23° and 33°, within 500 miles of the eastern coast.

The most common and widely distributed of the rutaceous trees are *Geijera parviflora* Lindl. (wilga), and *Eremocitrus glauca* Swingle (wild lime). These occur, for the most part, on the plains west of the coastal ranges; an exception is the occurrence of *Eremocitrus* on the coast in the vicinity of Rockhampton, Queensland. *Microcitrus australasica* Swingle (finger lime) and *M. australis* Swingle (dooja) are fewer in number and restricted in distribution. These occur in the coastal ranges of Queensland and northern New South Wales. *M. australasica* is found in the vicinity of the patches of coastal rain forests and *M. australis* somewhat further inland.

Saissetia hemispherica and *Coccus hesperidum* were found on the branches of *M. australis* on the Blackall Range. The leaves were attacked by a leaf-miner, which formed a circular cavity. This resulted in the formation of a yellow circular patch one-eighth inch in diameter on the leaf surface.

Pseudococcus longispinus, Saissetia hemispherica, and an undescribed species of *Saissetia* occurred on the finger limes on Tambourine Mountain, Queensland. A circular, flat, yellow, diaspine scale was also present. Gall insects attack the twigs, forming elongate galls about one-half inch in diameter. These are similar to the galls occurring on cultivated citrus, as described by Noble (5).

Geijera parviflora was carefully examined, particularly in the vicinity of Moree and Dubbo, New South Wales. The black, white-fringed larvæ of an aleyrodid was occasionally plentiful on the leaves. On some trees nearly every leaf was sparsely infested with an extremely small slender diaspine scale impressed on the upper surface. This scale is light yellow until maturity. Old scales are dark colored.

Isolated specimens of a species of *Paralecanium* were occasionally found on the upper surfaces of the leaves. This is an oval, perfectly flat, dark red scale, about one-tenth inch in length. The dorsum of the adult is heavily chitinized. Apparently it is viviparous. A round white diaspine scale, with a greenish center, also occurs on the leaves. On the limbs is found a dark scale, possibly *Mytilaspis wilga* Leonardi (3).

Interesting leaf galls are made by two species of thrips, *Choleothrips geijeræ* Moulton and *Dolerothrips geijeræ* Moulton (4). These produce galls by causing the edges of the leaves, which are long and narrow, to roll inward to form tubular cavities.

Eremocitrus glauca, the most abundant of the rutaceous trees, had the greatest diversity of insect fauna.

Apparently the first record of an insect attacking the native rutaceous trees was Froggatt's account (2) of the lime borer, *Citriphaga mixta* Lea. This is a beautiful longicorn beetle that oviposits in the bark a few inches above the ground. The larva works up the center of the trunk forming a large bore, often four or five feet in length. The work of the larva is followed by considerable gumming of the injured wood. The tree is thus weakened and sometimes killed. The wing covers of the adult beetle are marked with a pattern of snow-white patches of fine hairs against a background of dark brown.

The tender twigs and leaves are attacked by a weevil which is similar in life history and habit to the alfalfa weevil. Oviposition occurs in cavities excavated in the succulent twigs. The larvæ are bright yellow and are covered with slime to which particles of excreta adhere. They feed on the new plant tissue and when full grown are about one-half inch in length. Pupation occurs within a round yellow net-like cocoon. The adult is a robust gray beetle, nearly one-fourth inch in length.

A caterpillar, *Anomogenes morphnopa* Turner (7), a new

genus of the family *Œnochromidæ*, was found feeding on the leaves of the *Eremocitrus* in the vicinity of Roma, Queensland. The full-grown larva is about one inch in length and, like its host, gray-green in color. It has the appearance of a geometrid. When disturbed it straightens out and becomes rigid, with the head and legs withdrawn. It is not abundant. The eggs are deposited in groups on the leaves and are heavily parasitized.

A much smaller but more active caterpillar feeds on the bark of small limbs and twigs. It was quite abundant on *Eremocitrus* between Roma and Injune during August. An outstanding characteristic of the larva of this species is its habit of spending almost its entire larval and pupal periods within a long tough silken tube. Fine particles of yellowish frass are incorporated in the walls of this tube, which is convoluted about the twig. It increases in diameter from the point where the newly-hatched larva commenced feeding to that at which it ceased feeding. The total length may reach five or six inches. Larvæ were collected for rearing but they were destroyed by a tachinid parasite.

Another small caterpillar mines the leaves of *Eremocitrus*, causing the leaves to hang like gray paper sacks. The caterpillar is dark brown and holcocera-like in appearance. By the time the caterpillar is full grown the leaf is completely hollowed out. The leaf remains attached to the plant only because the larva had previously secured it by spinning a stout webbing about the base of the petiole and at the point of attachment to the twig. It was found in greatest abundance near Narromine, New South Wales.

A tree-hopper belonging to the Cicadelloidea (1) is one of the most generally distributed of the lime tree insects. The adult is dark gray and about one-fourth inch in length. In the vicinity of Chinchilla and Gogango, Queensland, they were found ovipositing from August to October. Oviposition occurred in parallel slots made in the bark of young twigs. Many of the eggs are parasitized. The nymphs are gregarious, congregating at the bases of the stems. According to Evans there are probably five nymphal stages, exclusive of the pronymph. The colonies are invariably attended by ants (probably Iridomyrmex) which feed on the excrement.

According to Summerville (6), the larger horned citrus bug, *Biprorulus bibax* Bred., is found in large numbers on the lime

during the summer when the trees are in fruit. It deposits pearly-white eggs on the surface of the plant. The adult is shining lemon-green in color, elongate oval, and about one inch in length. Feeding appears confined to the fruit if it is available, otherwise it probably feeds on the young tender growth.

There are a number of different gall-forming insects that attack the leaves, buds, fruits, tender twigs, and thorns. The bud gall is a single-celled capsule. The thorn galls contain several cells. Single-celled galls are formed of the ovaries within the fruits. Botanists have had difficulty in collecting the seeds of *Eremocitrus*, since most of them are destroyed by these insects (probably Eurytomids).

The galls in the tender twigs apparently are caused by a Cecidomyid. Red larvæ were observed within the galls.

Two undetermined species of aleyrodids attack *Eremocitrus*. The larva of the most common species is jet-black, fringed with short white filaments. Occasionally it becomes abundant enough to kill small plants. Heavy infestations were noted near Goondiwindi and Gogango. The adult is orange-yellow with white wings marked with three large yellow spots.

The second species is less common. More than four or five specimens on a single plant were rarely found. The larva is yellow, without wax filaments, and considerably larger than the preceding series. It is probably a species of *Bemesia*. It was found most readily near Surat.

Many species of coccids find the leaves of *Eremocitrus* to be a suitable host. These are:

Family Dactylopiidæ. Subfamily Asterolecaniinæ.

Cerococcus stellatus (Mask.) collected at Mootwingee, Trangie, Moree, New South Wales, and Chinchilla, Queensland, is usually found in the leaf axils or crevices in the bark. The wedge-shaped female is covered with a thick, waxy, brown secretion, 1 mm. to 2 mm. in diameter. It is rarely abundant although common.

Lecaniodiaspis atherospermæ (Mask.) is common on the branches of *Eremocitrus* from Trangie to Gogango. It was abundant enough near Meandarra, Queensland, to kill the plants. The immature stages are dark green, flat, and oval in outline. When mature they completely enclose themselves in a light tan-colored smooth hemispherical ovisac, about one-eighth inch in diameter. Oviposition occurs in August and September. The eggs are green.

It is apparently single-brooded.

Asterolecanium transversum Mask., collected at Mootwingee, New South Wales, and Gogango, Queensland, attacks the branches of *Eremocitrus*. Several plants were found to be heavily infested near Emerald, Queensland. The test of this insect is lemon-yellow, pear-shaped, and about two mm. in diameter.

Family Margarodidæ. Subfamily Monophlebinæ.

Monophlebulus crawfordi Ckll. is rarely found on *Eremocitrus*. Three specimens were collected near Surat, Queensland.

Family Coccidæ.

Ceroplastes rubens Mask., one of the worst pests of citrus in the humid regions of Australia, was found to be plentiful on *Eremocitrus* at Marmor.

Coccus hesperidum Linn. was observed near Chinchilla and Marmor, Queensland. It is rarely abundant and there is confined to a small portion of the tree. Only in two instances was it found abundant enough to result in the smutting of the foliage.

Coccus elongatus (Sign.) occurred on *Eremocitrus* at Marmor and Gogango, Queensland. It was not abundant and apparently requires a humid climate.

Coccus bicruciatum (Green) was found infesting the bumble tree, *Capparis mitchelli*, near Chinchilla. One specimen, however, was found on *Eremocitrus* at Blackwater, Queensland. When nearly mature it is yellowish-green, flat, oval, and about three-sixteenths inch in diameter.

Saissetia nigra (Niet.) occurred in numbers on several stunted plants at Gogango.

Saissetia hemispherica (Targ.) lightly infested the *Eremocitrus* at Marmor.

Saissetia oleæ (Bernard) was occasionally abundant on small plants. It was found at Chinchilla and Goowarra, Queensland. At Gogango several plants were found to have been killed by a heavy infestation of this scale. The chalcid *Scutellista* and the scale-feeding noctuid *Catoblemma dubia* Butl. were the only insect enemies of the scale observed.

At least eight species of diaspine scales were found on the *Eremocitrus*. The identification of the collected material has not yet been received.

One reddish-brown species (probably a mytilaspid) was found to be particularly destructive, attacking both leaves and

twigs. At Moree and Cornwall Station, Queensland, a large number of stunted plants were heavily infested. This infestation, combined with the effects of drouth conditions, had apparently killed many plants.

A round white scale (probably *Aspidiotus* sp.) was sometimes plentiful on the leaves, but no injury was observed.

A round, flat, chocolate-colored scale was found lightly infesting the leaves of lime in the vicinity of Blackwater. The scale covering measured 2¼ mm. in diameter. It was the largest of the armored scales on lime.

A white cigar-shaped scale was found at Marmor. It had the peculiar habit of settling only on the edges of the leaves. The effect of this was to give the leaf a serrated appearance. In this locality the stems of the lime were infested with a yellowish-gray scale. It was very long, narrow, and serpentine in shape.

Several specimens of what appeared to be *Chrysomphalus citrinus* were also collected from the line at Marmor. One specimen of *Comperiella bifasciata* was reared from this material.

Through the cooperation of Messrs. Lea, Evans, Turner, and Steinweden, it has been possible the indicate the names of some of the new species obtained. Mr. Steinweden also identified the unarmored coccids.

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NOTES ON SOME TETTIGONIINAE OF CALIFORNIA WITH DESCRIPTIONS OF NEW SPECIES

BY A. N. CAUDELL

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Recently there were received for determination several species of Tettigoniinæ from F. H. Wymore of the College of Agriculture of the University of California at Davis, California, and one from Mr. W. B. Cartwright of Sacramento, California.

In the collection of material received from Mr. Wymore was an adult female found in a nursery at Davis, California, September 15, 1932. This has been determined as *Capnobotes bruneri* Scudder, and a discussion of this follows:

CAPNOBOTES BRUNERI Scudder

This specimen of *bruneri* now deposited in the National Museum is apparently the second individual of this species known. It is somewhat more slender than the type specimen, and the tegmina are less uniformly brownish. The following measurements were made:

Length of pronotum 7 mm., of tegmina 50 mm., of posterior femora 30 mm., of ovipositor 33 mm.; width of pronotum posteriorly 5 mm., of tegmina at the widest part 8.5 mm., near the tip 4 mm.

The last dorsal segment of the abdomen above the triangular supra-anal plate is not so deeply cleft apically, and for that reason does not form such attenuated prolongations as in *C. fuliginosus* Thomas. In this respect it resembles *C. occidentalis* Thomas as represented by two females in the National Collection. (See figs. 1 and 2.)

In order to facilitate the determination of the species of the genus *Capnobotes* as now recognized, the following key has been made to separate the females:

A. Last dorsal segment of the abdomen apically deeply divided, the angles forming attenuated prolongations extending over the supra-anal plate, almost or quite reaching the tip (fig. 1); under wings rather uniformly and deeply fuliginous.....
.....*fuliginosus* Thomas

*The figures illustrating this paper were drawn by H. A. Allard.

A. Last dorsal segment of the abdomen less deeply divided apically, the angles forming prolongations scarcely exceeding the middle of the supra-anal plate (fig. 2); under wings generally less fuliginous in the posterior field.
  B. Tegmina near apex distinctly more than one-half as broad as their greatest width.
    C. General color brown or faun....*occidentalis* Thomas
    C. General color green or greenish
      D. Tegmina uniformly greenish.....
      .....*occidentalis* var. *uniformis* Caudell
      D. Tegmina greenish with a longitudinal row of light-colored discal spots.....
      ..... *occidentalis* var. *viridis* Cockerell.
  B. Tegmina near apex no more than one-half as broad as their greatest width.....*bruneri* Scudder

Idionotus similis Caudell, n. sp.

Specimens of a species of *Idionotus* received from Mr. Wymore very closely resemble superficially *I. brunneus* of Scudder, but are at once distinguishable from that species by the very distinctive cerci of the male, and the name *similis* has been given to it. A description follows:

Head scarcely as broad as pronotum. Vertex about one-half as broad as interocular space. Eyes black, moderately prominent, subequal in width to that of vertex. Basal segment of antenna about two thirds as broad as vertex.

Lateral lobes of thorax well developed and moderately declivate. Lateral carinæ distinct, rather sharp for their entire length, and bowed distinctly inwards at about the anterior third. Median carina distinct on a little more than the posterior fourth of pronotum. Anterior margin of pronotal disk moderately concave; posterior margin truncate. Prosternum wholly unarmed. Legs long and slender; fore tibiæ armed above on the outer margin with three or four spines. Hind femora over three times as long as pronotum and strongly swollen basally. Hind tibiæ with four apico-ventral spurs.

Tegmina of male strongly abbreviated, broadly overlapping, and projecting from beneath the pronotal disk a distance equal to about two-thirds the posterior width of pronotum. Tegmina of female barely overlapping, and projecting from beneath the pronotum to a much less degree. Under wings abortive in both sexes.

Abdomen rather plump, the last dorsal segment transverse in both sexes, in the male very broadly and roundly concave. Supra-anal plate triangular and dorsally broadly sulcate in both sexes,

in the female so closely fused with the last dorsal segment of the abdomen as to make the connecting suture very obscure, or almost obliterated (fig. 3). In the male the connecting suture is very distinct (fig. 4). Subgenital plate broad, apically shallowly notched in both sexes, in the female furnished with a pair of unsegmented apical styles three or four times as long as basally broad, tapering, the apical third rather abruptly so (fig. 3). Cerci of male short and stout, curved gently inwards, scarcely more than twice as long as the middle width, slightly flattened with the sides subparallel, apex broadly notched, inner angle somewhat more produced and slightly thicker than the outer (fig. 4). Ovipositor noticeably shorter than the posterior femora and curved very gently upward. General coloration light yellowish brown with the legs generally tending toward a darker color except the base of the femora.

Length of body from front of head to tip of abdomen, male 22 mm., female 23 mm.; length of pronotum, male 6.5 mm., female 6.75 mm.; length of tegmina beyond pronotal disk, male 2.5 mm., female 1.5 mm.; posterior femora, male 20 mm., female 23 mm.; length of ovipositor 19 mm.; width of pronotal disk posteriorly, male 4 mm., female 4.25 mm.; width of ovipositor at middle 1.5 mm.

Described from four males and one female, all adults, taken at Caribou, on the Feather River, California, July 6, 1932, by Mr. F. H. Wymore.

Holotype male, allotype female, and one male paratype in the United States National Museum, Catalogue No. 44901. The other two paratypes, males, are in the collections of the University of California.

Three specimens, two males and one female, which have been identified as a hitherto unrecognized variety of *Idiostatus inermis* Scudder, were also sent by Mr. Wymore. A description of it follows:

Idiostatus inermis major, Caudell, n. var.

Length of body from head to tip of abdomen, male 27 mm., female 26 mm.; length of pronotum, male 7 mm., female 6.5 mm.; length of tegmina beyond pronotal disk, male 4 mm., female 2.5 mm.; length of posterior femora, male 21 mm., female 23 mm.; length of ovipositor 26 mm.

Apical teeth of cerci of male (fig. 5), especially the submedian tooth, much more elongate in typical *inermis* (fig. 6).

Described from three specimens collected at Doyle, Lassen

County, California, July 1930. The holotype, male, and allotype, female, are deposited in the U. S. National Museum, Catalogue No. 44907. The paratype male, which was slightly smaller than the holotype, was returned to Mr. Wymore.

Since the publication of the author's revision of the Decticinæ[1], a quarter of a century ago, material of *I. inermis* has come to hand from Nevada, northern California, and Oregon. Although the species is now known to be variable in size, the usual dimensions are about as given in the author's original description. Specimens from Chester, California, examined by the writer are very small, with the following measurements:

Length of body from front of head to tip of abdomen, male 19 mm., female 16 mm.; length of pronotum, male 4.5 mm., female 5 mm.; length of posterior femora, male 13 mm., female 16 mm.; length of ovipositor 17 mm. Except for their small size these agree very well with typical *inermis*, and they are determined with little doubt as that species.

The unusually large specimens received from Mr. Wymore, on the other hand, represent the other extreme, and their large size together with the strikingly different cerci of the male as compared with those of *inermis* seem to warrant the varietal name *major* above proposed.

The material received from Mr. W. B. Cartwright of Sacramento, California, has proven to be an undescribed species belonging to the genus *Idiostatus*. In the author's key to the previously known species of this genus the male of the new species runs out to *fuscopunctatus* Scudder, but the cerci are differently shaped; the female runs to *inermis* Scudder. This new species is not, however, closely allied to either of these. It is described as follows:

Idiostatus fuscus Caudell, n. sp.

Head inserted into the pronotum almost to the eyes, the cheeks swollen to a width slightly greater than that of the pronotum behind them. Eyes moderately prominent. Fastigium of the vertex about two-thirds as broad as the interocular space. Antennæ when directed backwards extending beyond the middle of abdomen.

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[1] Proc. U. S. Nat. Museum, Vol. XXXII, p. 386 (1907).

Pronotum with the lateral lobes well developed and moderately declivate. Anterior margin of pronotal disk very broadly rounded, the posterior margin truncate. Median carina of pronotum distinct only on the posterior third and not at all conspicuous even there. Lateral carinæ of pronotum not indicated on the anterior two thirds represented posteriorly by rounded shoulders. Prosternum unarmed.

Legs short, the posterior femora about three times as long as the pronotum in male, less in female, and rather strongly swollen basally. Anterior tibiæ with three dorsal spines on the outer margin. Posterior tibiæ with four apical spurs, ventral pair equal in length, lateral pair unequal the outer spur about twice as long and the inner almost three times as long as one of the ventral ones. Free plantulæ of hind tarsi well developed, about two fifths as long as the basal segment. Tegmina present in both sexes, in the male overlapping and projecting from beneath the pronotal disk a distance equal to about one-half the pronotal length, in the female forming widely separated lateral pads projecting very slightly beyond the pronotal disk.

Abdomen moderately plump, dorsally very slightly keeled. Last dorsal segment transverse and apically notched, much more broadly so in the male. Supra-anal plate of both sexes triangular, in the male more acute apically and strongly deflexed. Subgenital plate of male very noticeably longer than broad, apically triangularly notched and bearing a pair of apical styles about four times as long as broad; subgenital plate of female not or barely longer than broad and notched apically as in the male. Cerci of male a little more than three times as long as basally broad, armed about the middle with a stout tooth, apically slightly curved, and having the inner side from the tooth to the tip moderately convex (fig. 8). Cerci of female simple, about three times as long as the basal width and tapering rather uniformly to the tip. Ovipositor somewhat longer than the posterior femora, rather slender, very gently upcurved, and apically sharply pointed.

General color dark reddish brown, darker than the usual color for species of this genus. Sides of pronotum and abdomen apically, except beneath, blackish, the former usually narrowly margined below with yellowish. Face, ventral surface of body and femora, more especially the posterior pair, lighter in color. Tegmina of the male slightly lighter than the rest of the dorsal coloration, without apical spots. Ovipositor yellowish.

Length of body from front of head to tip of abdomen, male 17 mm., female 22 mm.; length of pronotum, male and female, 5.5 mm.; length of tegmina beyond pronotal disk, male 3.3 mm., female 1 mm.; length of posterior femora, male 13 mm., female 16 mm.; length of ovipositor 19 mm. Width of pronotum posteriorly, male and female, 4.5 mm.; width of posterior femora at broadest point,

male and female, 3 mm.; width of ovipositor at middle 1.3 mm.

Described from three male and three female adults, and one female nymph, all labeled "Ralston Peak, California," and taken by C. C. Wilson, October 13, 1932.

Holotype male and allotype female, two paratypes, male and female, and the nymph, in the United States National Museum, Catalogue No. 44902. The other two paratypes, male and female, were returned to Mr. Cartwright.

Idiostatus wymorei, Caudell, n. sp.

Allied to *Idiostatus fuscus* Caudell and in a key to species falls next to that insect, from which it seems amply distinct, especially in the genital characters of the male.

Head well inserted into the pronotum, the cheeks very slightly swollen; eyes slightly smaller but somewhat more prominent than in *fuscus;* interocular space and antennæ as described under *fuscus.* Legs about as in that species except the free plantula of the posterior tarsus averages somewhat shorter than in *fuscus* and the hind femora are relatively longer, being at least two and one half times as long as the pronotal disk. Tegmina and abdomen about as in *fuscus* but the last dorsal segment of the abdomen of the male seems to be usually less broadly concave and the cerci of the male are quite different; the inner tooth of this organ, as shown by the accompanying figure, is placed much beyond the middle of the cercus, while in *fuscus* it is situated about the middle; the inner surface of the tip of the cercus beyond the tooth is scarcely at all convex, thus differing noticeably from that of *fuscus.* The ovipositor is rigidly straight, not at all curved upwards, and is noticeably longer than the posterior femora.

General color almost uniformly light yellowish brown with a tinge of greenish on the posterior third of the pronotal disk; the tip of the abdomen and apex of the tegmina of the male unicolorous with the rest of the body.

Length of body from head to tip of abdomen, male 20 mm., female 21 mm.; pronotal disk, male and female, 6 mm.; tegmina beyond pronotal disk, male 4.5 mm., female 0.5 mm.; posterior femora, male 16 mm., female 17 mm.; ovipositor, 22 mm. Width of pronotum posteriorly, male and female, 4.5 mm.; posterior femora at widest point of both sexes, 3 mm.; ovipositor at middle, 1.3 mm.

The coloration varies rather decidedly in the series of specimens examined, ranging from that of the holotype and allotype described above to a blackish brown; the females seem more prone to exhibit this darker coloration. The posterior third of the pronotal

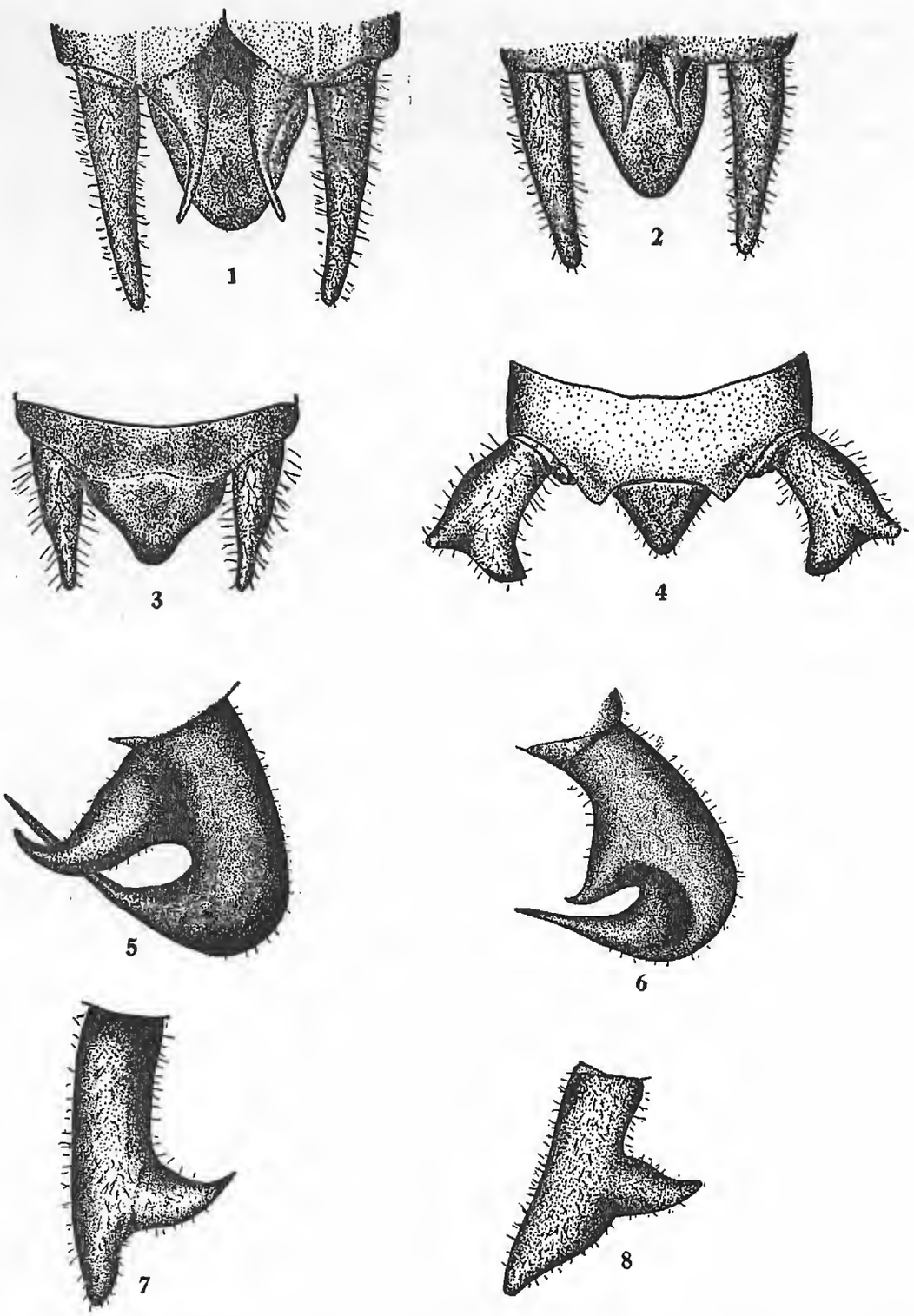

Fig. I. *Capnobotes fuliginosus* Thomas, tip of abdomen of female from above; Fig. II. *Capnobotes bruneri* Scudder, tip of abdomen of female from above; Fig. III. *Idionotus similis* n. sp., tip of abdomen of female from above; Fig. IV. *Idionotus similis* n. sp., tip of abdomen of male from above; Fig. V. *Idiostatus inermis* var. *major*, n. var., dorsal view of cercus of male; Fig. VI *Idiostatus inermis* Scudder, dorsal view of cercus of male; Fig. VII. *Idiostatus wymorei* n. sp., dorsal view of cercus of male; Fig. VIII. *Idiostatus fuscus* n. sp., cercus of male.

disk may be as noted in the above description or almost or quite unicolorous with the rest of the pronotum. The general coloration occasionally assumes a faint mottled appearance. In size and structure there is but little noticeable variation in either sex.

Described from thirteen males and thirteen females taken at Strawberry, El Dorado Co., California, on September 14, 1934 by F. H. Wymore.

Holotype male and allotype female and nine paratypes, five males and four females, in the United States National Museum. Catalogue No. 50739. The other paratypes, seven males and eight females, were returned to Mr. Wymore.

This species was at first thought to possibly be the *Idiostatus fuscopunctatus* of Scudder, an idea abandoned when the differently shaped cercus and the apically black-marked tegmina of the male of the latter species were considered. It has been christened in honor of its collector.

Neduba diabolicus Scudder

The insect described by Rehn and Hebard as *Aglaothorax sierranus* should, in the author's opinion, be transferred to the genus *Neduba*. Mr. Hebard has informed him that recent studies have shown this to be a synonym of Scudder's *Tropizaspis diabolicus*, both these specific names being referable to the genus *Neduba*.

Note on the Liebeck Collection

We have heard that the collection of Mr. Charles Liebeck has been deeded to Dr. H. C. Fall. This is one of the first class private collections in the country, assembled through a period of many years and containing many specimens received from Dr. George Horn and from most of the other well known coleopterists of the country, as well as great numbers collected by Mr. Liebeck himself from the environs of Philadelphia. Though much desirable material in certain groups had already been distributed before Mr. Liebeck decided to part with his collection, what remains will serve to greatly augment the already most valuable collection of Dr. Fall.—E. C. Van Dyke.

A COLLECTION OF TERMITES FROM ARIZONA

BY S. F. LIGHT

The termites here reported were collected by Dr. Wolfgang von Hagen during the spring of 1933 in the vicinity of Tucson, Arizona and in the Ajo Valley, Arizona. No alates were present but late instar reproductive nymphs were present in several collections. Determinations therefore were based on soldiers.

RETICULITERMES HUMILIS Banks

A single collection from the vicinity of Tucson.

HETEROTERMES AUREUS Snyder

Two collections from the Ajo Valley and one from near Tucson.

NASUTITERMES (TENUIROSTRITERMES) CINEREUS (Buckley)

Three collections from the Sonoran plateau in extreme south central Arizona near the Mexican border. This species has been known heretofore only from Texas (Banks and Snyder 1920) while the Arizona species has been determined as *N. (T.) tenuirostritermes* Desneux. These nasutes agree perfectly with those in my collection taken by Babcock in Sonora, Texas, and with the available descriptions of *N. cinereus*.

It has seemed worth while to give a brief description of these nasutes in view of the meagerness of existing descriptions.

Color: Tergites and nota smoky brown; sternites and coxæ pale smoky; legs (beyond coxæ) and palpi pale yellow to white; antennæ smoky yellow in basal half becoming lighter distally; head smoky mahogany; rostrum black in basal three-quarters, with pale tip.

Head of three regions, approximately equal in length, an uplifted region posterior to the constriction, a middle region extending from the constriction to the base of the rostrum and finally the rostrum. Dorsal profile faintly convex between constriction and base of rostrum. Rostrum slightly uplifted, narrow, only slightly enlarged near its base, decreasing very slightly in thickness to near tip where abruptly narrowed to minute hyaline tip. Middle portion of head widest at its anterior end where nearly three-quarters as wide as posterior end. Antennæ of 12 or 13 segments.

Measurements in millimeters of nasute of *N. (T.) cinereus* (Buckley) from southern Arizona: Length with head extended, 3.30;

length of head with rostrum, 1.44; length of head without rostrum, 0.96; length of rostrum, 0.48; length of head between constriction and base of rostrum, 0.45; length of head posterior to constriction, 0.51; maximum width of head, 0.69; width of head at constriction, 0.48; maximum width of head in front of constriction, 0.55; width of rostrum at center, 0.08.

AMITERMES (AMITERMES) MINIMUS Light
(=*A. wheeleri* of Banks and Snyder 1920)

Two collections from the Ajo Valley.

AMITERMES (AMITERMES) WHEELERI (Desneux)
(=*A. californicus* Banks and Snyder 1920)

Two collections from the Ajo Valley and one from Tucson. These are all of the smaller type with lighter, more slender mandibles and teeth, a type which may prove to be distinct from the larger, darker type found in California.

AMITERMES (GNATHAMITERMES) PERPLEXUS Banks

Twelve collections from the Ajo Valley and the vicinity of Tucson show this to be the prevalent species of the subgenus in this region. Most of the soldiers agree fairly closely with my characterization of the soldier of this species (1932).

Three very aberrant soldiers led me to believe at first that I was dealing with a separate and new species. Indeed, had they not been taken with soldiers and workers of *A. perplexus* they would almost certainly have been so treated by any systematist. A description follows. The remarkable uniformity in character of these three soldiers from as many colonies raises the question as to their status in the caste system. Two theories suggest themselves. That they represent a small soldier caste such as occurs in other genera or that they represent some regularly occurring intercaste, such as the fertile soldiers found in *Zootermopsis.*

Description of aberrant soldier of *A.* (*G.*) *perplexus*:
Similar to normal soldiers in head and body characters but smaller in all proportions. Mandibles very slender, without teeth, lateral margin concave, inbent below and outbent beyond level at which teeth would ordinarily occur.

Measurements of aberrant soldier of *A.* (*G.*) *perplexus*:

Length of head, 1.08; width of head, 1.02; length of left mandible, 1.17; minimum mandible curvature, 0.03; mandible curvature index, 0.025; head index, 0.95; head mandible index, 0.92.

MOSQUITO RECORDS FROM UTAH

BY DON M. REES
University of Utah

The following records of the mosquitoes of Utah are presented as a preliminary list from specimens now in the collection of the University of Utah. The records and species here listed are incomplete for the state and will be supplemented as further collections are made.

The species listed are the more common mosquitoes of this section and in most instances are represented in the collection by numerous specimens. Most of the species were identified from adult male genitalia, and larvæ. A few were identified from specimens of adult females but all such identifications were checked by Dr. Alan Stone of the United States Bureau of Entomology.

AEDES VEXANS Meigen

This species has been taken in the valleys through the central and northern part of the state, from May to October. Several broods occur during the season breeding in warm shallow ground pools created by rain or irrigation water. They are very numerous at times and the females bite readily, particularly at dusk and in the early morning.

Utah: Salt Lake City, May to October, 1929 to 1932 (Rees); Bear Lake, August 11, 1929 (Rees); Logan, June to August, 1930 (J. S. Stanford); Springville, June 15, 1930 (Rees); Richfield, July to September, 1930 (light trap); Mill Creek, May to October, 1930 to 1932 (Rees); Wales, August 23, 1931 (Rees); Nephi, August 23, 1931 (Rees); Ogden, July 29, 1932 (Rees); Provo, August 12, 1932 (Rees).

AEDES DORSALIS Meigen

Aedes dorsalis Meigen is the most common pest mosquito in the valleys and deserts of Utah. It is state wide in distribution, breeding in open ground pools, particularly in salt grass flats flooded with rain or irrigation water. A new brood appears after each flooding. The first brood appears just as the snow melts in the spring and successive broods are found until late in the fall. The adult females will bite any time but are more active at dusk. They sometimes migrate considerable distances from their breeding areas.

Utah: Salt Lake City, June, 1914; Corinne, September 9, 1925; Ogden, October 18, 1928 (W. H. W. Komp); Holiday, October 22, 1928 (Rees); Riverton, October 25, 1928 (Rees); Murray, October 25, 1928 (Rees); Salt Lake City and vicinity, March to October, 1928 to 1932 (Rees); Bear Lake, June 1, 1929 (Gertsch); Wales, June 6, 1929 (Rees); Salina, July 7, 1929 (J. S. Stanford); Logan, June to August, 1930 (J. S. Stanford); Echo, July 5, 1930 (Rees); Richfield, July to September, 1930 (light trap); Wendover, November 1, 1930 (Rees); Salt Springs, November 1, 1930 (Rees); Provo, June 21, 1931 (Rees); Springville, June 21, 1931 (Rees); Spanish Fork, June 21, 1931 (Rees); Payson, June 21, 1931 (Rees); Promontory Point, June 25, 1932 (Newby); Black Rock, August 2, 1932 (Rees); Ferron, August 27, 1932 (Rasmussen); Locomotive Springs, September 9, 1932 (Rees).

AEDES CAMPESTRIS Dyar and Knab

This species has been collected in the central and northern part of the state in the same localities as *Aedes dorsalis* Meigen. The larvæ are found only in the spring but some adults remain throughout the season. They feed at any time but are more active at dusk.

Utah: Salt Lake City, October 10, 1928 (J. A. LePrince); Salt Lake City and vicinity, May to September, 1929 to 1932 (Rees); Wales, May 19, 1929 (Rees); Salina, July 9, 1929 (J. S. Stanford); Corrine, July 7, 1930 (J. S. Stanford); Richfield, July to September, 1930 (light trap); Logan, August 27, 1930 (J. S. Stanford); Salt Springs, November 1, 1930 (Rees); Locomotive Springs, September 9, 1932 (Rees).

AEDES NIPHADOPSIS Dyer and Knab

This species has been previously reported only in the vicinity of Salt Lake City. Bear Lake is 127 miles northeast of Salt Lake City and Wales 115 miles south. Undoubtedly further collections will show a much wider distribution. The larvæ appear early in the spring in small ground pools filled by melting snow and spring rains. They occur in great numbers on bench lands along the foot-hills in the spring but are all gone by early summer. The adult females bite freely during the daytime.

Utah: Salt Lake City and vicinity, April to June, 1929 to 1932 (Rees); Bear Lake, June 11, 1929 (Rees); Wales, April to June, 1930 to 1932 (Rees).

AEDES COMMUNIS De Geer

This species has been found only in woodlands in high mountain regions in the north-eastern part of the state. Further collections will undoubtedly show a wider distribution.

Utah: Beaver Creek at Lone Tree, July 6, 1929 (Rees); Kamas, June 15, 1930 (Rees); Smith Fork, July 6, 1930 (Rees); Smith and Moorehouse, June 15, 1930 (Rees).

AEDES CATAPHYLLA Dyar

This species was taken in a high mountain meadow in a heavily wooded area. They were breeding in great numbers in pools formed along the creek by overflow.

Utah: Smith and Moorehouse, May 16, 1931 (Rees).

AEDES PUNCTOR Kirby

Collected in the wooded mountain regions in the north eastern part of the state. They develop in early spring, usually in pools containing decaying organic matter. They remain in the shelter of the woods and bite during the day or at dusk.

Utah: Beaver Creek, July 6, 1929 (Rees); Granddaddy Lakes, August 3, 1929 (Gertsch); Kamas, June 15, 1930 (Rees); Smith Fork, July 6, 1930 (Rees); Heber City, July 9, 1932 (Rees); Tryol Lake, August 14, 1932 (Rees).

AEDES STIMULANS Walker

Aedes stimulans Walker is very prevalent and troublesome throughout the central and northern part of the state. It is typically a woodland species and does not occur in the desert areas. One brood a year is produced, the larvæ developing early in the spring but in high mountain regions not until June or July. Some adults survive until late in September.

Utah: Chalk Creek, June 22, 1929 (Rees); Beaver Creek, July 6, 1929 (Rees); Granddaddy Lakes, August 3, 1929 (Gertch); Parley's Canyon, June 24, 1930 (Randle); Smith Fork, July 6, 1930 (Rees); Salt Lake City, May 17, 1931 (Randle); Smith and Moorehouse, May 16, 1931 (Rees); Logan, July 9, 1931 (J. S. Stanford); Heber City, July 9, 1932 (Rees); Aspen Grove, July 10, 1932 (Rees); Mountain Dell Reservoir, September 17, 1932 (Randle).

AEDES EXCRUCIANS Walker

Found in the same localities as *Aedes stimulans* Walker. Their development and habits are similar to *Aedes stimulans* Walker, but they are not so numerous or troublseome.

Utah: Granddaddy Lake, August 3, 1929 (Gertsch); Smith Fork, July 6, 1930 (Rees); Salt Lake City, May 11, 1931 (Rees); Ferron, August 27, 1932 (Rasmussen).

AEDES FLAVESCENS Müller

Not common but seems to be more numerous in the northern part of the state.

Utah: Bear Lake, June 1, 1929 (Gertsch); Salt Lake City, June, 1930 (Rees).

AEDES FITCHII Felt and Young

This record is from a high mountain lake in the central part of the state. Further collections will undoubtedly show a wider distribution.

Utah: Fish Lake, August 20, 1929 (Rees).

AEDES NIGROMACULIS Ludlow

Perhaps state wide in distribution. Not very abundant or troublesome.

Utah: Salt Lake City, June 13, 1930 (Rees); Logan, August 27, 1930 (J. S. Stanford); Richfield, July to September, 1930 (light trap).

THEOBALDIA INORNATA Williston

This species is state wide in distribution and can readily be collected throughout the year. The larvæ appear in May and continue until November, when they have been taken frozen in ice. They breed in many different kinds of pools in great numbers. The adult females are not troublesome but will occasionally bite at dusk.

Utah: Salt Lake City and vicinity, May to November in the field and November to May in buildings, 1929 to 1932 (Rees); Bear Lake, August 11, 1929 (Rees); Black Rock, September 2, 1929 (Rees); Logan, June to September, 1930 (J. S. Stanford); Richfield, July to September, 1930 (light trap); Zion National Park, September 6, 1930 (Rees); Springville, July 7, 1931 (Rees); Nephi, August 23, 1931 (Rees); Promontory Point, May 25, 1932 (Davis); Hanna, July 24, 1932 (Rees).

THEOBALDIA INCIDENS Thomson

Collected through central and northern part of the state. The larvæ are usually found in clear, cold spring pools. Adults never very numerous.

Utah: Salt Lake City, May to September, 1929 to 1932 (Rees); Bountiful, May 27, 1930 (Stafford); Kamas, June 15, 1930 (Rees); Logan, June to September, 1930 (J. S. Stanford); Nephi, August 23, 1931 (Rees).

THEOBALDIA IMPATIENS Walker

In high mountain woodlands. Biting very viciously just at dusk.

Utah: Smith and Moorehouse, May 16, 1931 (Rees); Aspen Grove, July 10, 1932 (Rees).

CULEX TARSALIS Coquillett

In the valleys throughout the state, usually in the vicinity of human habitations. Breeding in greater numbers late in the season. The adult females are more troublesome late in the evening.

Utah: Salt Lake City and vicinity, May to October in the field and occasionally in hibernation during the winter, 1929 to 1932 (Rees); Bear Lake, August 11, 1929 (Rees); Garfield, November 5, 1929 (Rees); Logan, June to October, 1930 (J. S. Stanford); Richfield, July to September, 1930 (light trap); Zion National Park, September 6, 1930 (Rees).

ANOPHELES MACULIPENNIS Meigen

Anopheles maculipennis Meigen is found throughout the state in great numbers where breeding conditions are favorable. They have not as yet been taken at an elevation above 7,500 ft. Breeding is more abundant in late summer and early autumn. The females attack man quite readily at evening and at night.

Utah: Utah County, September 9, 1910, July 10, 1914. Salt Lake City, October 2, 1928 (J. A. LePrince); Holiday, October 17, 1928 (W. H. W. Komp); Murray, October 25, 1928 (Rees); Salt Lake City and vicinity, May to November in the field and November to May in hibernation, 1929 to 1932 (Rees); Bear Lake, August 11, 1929 (Rees); Logan, July to December, 1930 (J. S. Stanford); Zion National Park, September 6, 1930 (Rees); Ibipah, November 2, 1930 (Rees).

NEW CALIFORNIA CICADAS

BY F. H. WYMORE

U. C. College of Agriculture, Davis, California

Okanagana arboraria Wymore, n. sp.

Medium size, shiny black above, marked with orange,[1] mostly orange beneath. Length 23 mm.; expanse of forewings 64 mm. width 10 mm.

Holotype: *Head* black, 7 mm. across eyes, not quite so broad as the front margin of the pronotum; front black, moderately produced, median sulcus well defined; tinged with orange; supra-antennal plates and epicranial sutures orange; antennæ black; rostrum black, orange at base.

Thorax opaque black above marked with orange; orange beneath spotted with black. Pronotum black, margined all around with orange except small space on front margin just back of eye; immediately behind which is an orange colored patch; humeral angles rounded, anterior angles well defined, lateral margins smooth except shallow notch near center. Mesonotum narrowly margined with orange; wings with veins orange, becoming slightly darkened about the marginal cells; basal cell clear except tinge of orange along anterior border; membranes at base of both pairs of wings brilliant orange;[2] legs pale orange with black spots about knees.

Abdomen with tergum shiny bluish black, tergites narrowly margined with orange and with a slight golden pubescence; uncus black 2.5 mm. long, when viewed in profile with lower margin almost straight; from dorsal view greatly broadened in middle and slightly notched at tip; ædeagus with main trunk heavily chitinized, lateral lobes and verga thinly chitinized and straw color, viewed from above adeagus deeply grooved between lateral lobes; verga broadly lobed just back of lateral lobes tapering distally to sharp point. Below orange except a black patch on anterior margin of first abdominal segment and a black dot on outer margin of third and fourth segments; last ventral segment with sides slightly curved toward apex, feebly notched; valve orange, 5 mm. long, 1.75 mm. broad at widest point.

Allotype the same as type except the expanse of forewing

[1] "Orange rufous" of Ridgway's Color Standards and Nomenclature, Pl. II, series i.

[2] Between "Flame scarlet" and "orange chrome," Ridgway, Pl. II.

is 66 mm. Last ventral segment broadly double-notched.

Holotype, male (No. 3903), allotype, female (No. 3904, C.A.S. Ent.), and fifty-nine paratypes, two ♀ and 57 ♂ were examined. These were collected primarily along the lower end of the Sacramento River in Sacramento County, July-September, 1923-1928, as follows: thirty-nine near Courtland; fifteen on Brannon Island, near Rio Vista; one on Sherman Island, just below Brannon Island; one at Freeport. In Yolo County, three at Davis and one at Woodland. All were collected by the writer except one male specimen at Davis presented by A. S. Harrison, August 20, 1932, and a female from Salida and a male from Long Barn, presented by R. L. Usinger in 1932.

The members of this species may vary in color from shiny black marked with orange to a uniform orange rufous (variety crocea n. var. type male, No. 3905, C.A.S. Ent. with only a few tiny blotches of black along the lateral margin of the tergites. The black specimens seem to predominate, however, and the various intermediate stages were found. Similar color variations of *O. triangulata* Davis may also be found among specimens taken about Suisun Bay area with which species *arboraria* was confused for several years. It is, however, considerably larger than *triangulata.*

Okanagana albibasalis Wymore, n. sp.

Medium size, mostly black marked with brown,[3] fading out to a clay[4] color on the margins of the segments and appendages. Length 26 mm.; expanse of fore wings 66 m..

Holotype: *Head* black 8 mm. across eyes, not quite so broad as front margin of pronotum; front moderately produced, margined with clay color at base, median sulcus well defined, antennæ black, rostrum black clay color at base, supra-antennal plates marked with clay color.

Thorax opaque black, clothed with moderately long white hairs beneath, edges of sclerites and portions of appendages clay color. Pronotum with posterior and lateral margins and a median and three lateral marks brown; humeral angles rounded, anterior angles well defined; lateral margins only shallowly notched. Mesonotum black, the posterior margin, the elevated

[3] Hazel of Ridgway's, Pl. IV, ser. k.

[4] Clay color of Ridgway's, Pl. V, ser. b.

X, and four small anterior spots and a small spot at base of fore wings clay color; fore wings 11 mm. broad, veins mostly brown with black blotches, costal vein clay color, basal cell clear except anterior border tinged with brown; membranes at base of both pairs of wings white; legs black marked with clay color.

Abdomen with tergum shiny black with sparce white pubescence, area about tympana marked with brown; uncus black, 3 mm. long, not notched at tip, shape as figured; ædeagus greatly thickened and broadened just anterior to the lateral lobes, deeply grooved between the lobes; verga moderately broadened just posterior to the lateral lobes. Sternum black marked with clay color along the lateral and posterior margins of the sternites; last ventral segment constricted at the side with humeral angles rounded and a shallow apical notch at the center of the segment. The posterior third of the segment clay color. Valve black, narrowly margined with clay color, 3.25 mm. long, 2 mm. broad at widest point.

Allotype same as type: The last ventral segment has a double notch with the sides straight to the rounded humeral angles.

Holotype, male, No. 3906, allotype, female, No. 3907, C.A.S. Ent., and 37 paratypes have been examined. These were collected mainly in the hills of the East Bay district; thirteen males and three females near Berkeley, seven males near Rodeo, seven males and one female in Santa Cruz Mountains and about Mt. Hamilton, one male at Martinez, one male near Fairfield, one near Vacaville, Solano County, one in Tuolumne County, one in Los Angeles County on the ridge route about 18 miles north of Saugus, and two from Sespe Canyon, Ventura County.

The darker specimens of this species until recently have been confused with *O. canescens* Van D. and the paler forms with *O. napa* Davis. The darker forms agree with *O. canescens* generally in size of body and size and shape of wings and uncus but their more robust shiny black body, the white basal membrane of the wings, short broad valve, the broader thicker ædeagus and the coarse metallic song, disagree with the more slender pubescent body with orange venter, the brilliant orange basal membranes of the wings, the longer orange colored valve, the more slender ædeagus (Fig. 3) and the higher pitched song of *O. canescens.* The paler forms differ form the darker specimens by the clay-colored markings being more extended over

the body, varying from slightly paler prothorax, wings and venter to entirely clay-colored except the black tergum and spots about the front and knees (one specimen). *Okanagana napa* Davis has a more slender, pubescent, orange-marked body, narrower wings with brilliant orange basal membranes and a more slender valve and ædeagus.

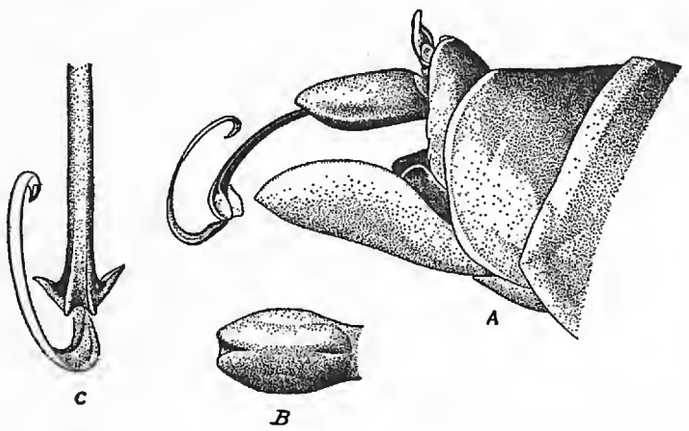

Fig. 1, Okanagana arboraria n. sp., male genitalia

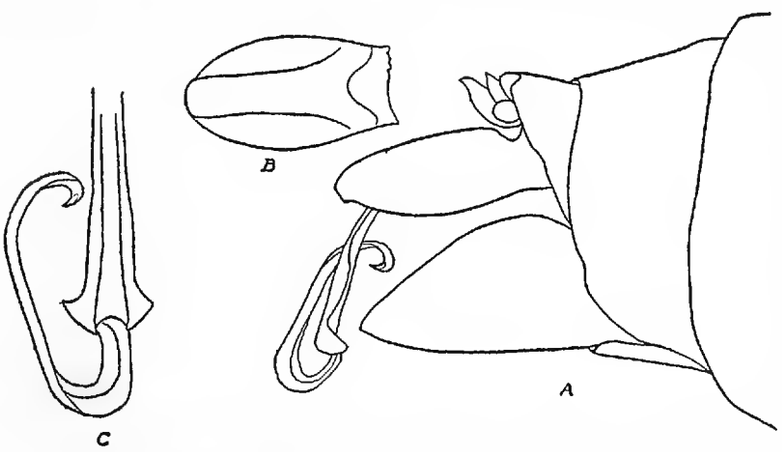

Fig. 2, Okanagana albibasalis n. sp., male genitalia

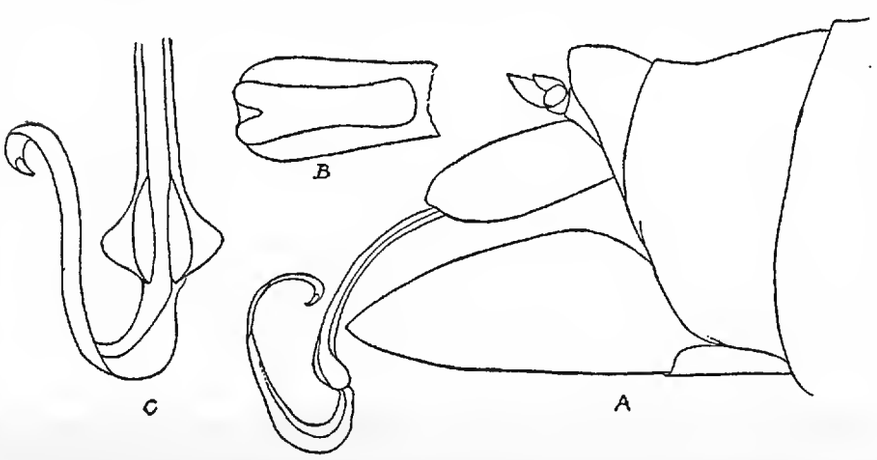

Fig. 3, Okanagana canescens V. D., male genitalia

A NEW PENTATOMID FROM TRINIDAD, W. I. (HEMIPTERA)

BY E. P. VAN DUZEE

1. Banasa bidens Van Duzee, n. sp.

Very close to *subrufescens* but with coarser and more uniform puncturation, longer rostrum, broader white margin to apex of scutellum and distinct genitalic characters. Length 8 mm.

Head nearly as long as its width at anterior angle of eye, coarsely, sparsely punctate, the edge slenderly dark. Pronotum as in *subrufescens*, coarsely punctate, sparsely before the humeri, more closely behind; latero-anterior margins rectilinear, the adjoining surface depressed. Scutellum coarsely punctate as in the allied species but with the apex more broadly smooth and whitish. Elytra as in *subrufescens* but with the outer apical angle more rounded. Antennal segments as 8:11:18:25:22. Rostrum attaining middle of second ventral segment. Propleuræ coarsely punctate, meso- and metapleuræ obscurely so; venter smooth, basal spine a mere tubercle. Basal plates of female genital segment as in *subrufescens*, deeply excavated, median plate narrow. Apex of male pygofer more deeply excavated than in *subrufescens*, the fundus truncate with a pair of approximate short blunt teeth; sides convex and heavily clothed with long pale hairs, the apical notch a right angle; styles curved, ligulate to near the broad truncated apex, its upper inner angle produced, subhastate.

Color ochraceous varied with olive green or castaneous on the corium; fusco-punctate, the apex of the scutellum becoming smooth and whitish; beneath pale, yellowish, incisures of connexivum with distinct black spots; apex of claws and of the rostrum black; tergum mostly dark castaneous; antennæ pale greenish or yellowish, apical half of V and most of IV infuscated; membrane hyaline, brown at base. Described from ten specimens in author's collection.

Holotype, male, No. 3887, and allotype, female, No. 3888, Calif. Acad. Sci. Ent., taken by Mr. H. D. Chipman, May 13 and 22, 1902, at Port au Prince, Trinidad, W. I.; paratypes six males same data, and one pair taken at Demerara, British Guiana, April 12, and May 7, 1901, by Mr. R. J. Crew.

This species has altogether the aspect of *subrufescens* but the male genital characters are very different; the two teeth of the pygofer also will distinguish this new species.

A NEW NAME AND OTHER MISCELLANEOUS NOTES

(Coleoptera)

BY H. C. FALL
Tyngsboro, Mass.

I have been kindly informed by Dr. M. H. Hatch of Washington State University that the specific name *temporale* used for a species of *Agathidium* in my recently published paper on this genus (Ent. Amer., XIV, 1934) is preoccupied by J. Sahlberg (1908) for a species from Anatolia. I wish therefore to propose **municeps** n. n. in its stead.

The present opportunity is taken to make known some more or less recent synonymy and a few other miscellaneous notes.

AMARA (CYRTONOTUS) AULICA Panz.

A specimen of this European species was taken by the writer at Louisburg, Nova Scotia, VIII-19-29. The identification is by Ing. Jedlicka through the kind offices of Dr. Walther Horn of Berlin. It is perhaps too soon to assume that the species has become established with us.

HYDROPORUS BRUMALIS, H. COMPERTUS, H. FALSIFICUS

These species, all recently described by Mr. W. J. Brown in the Canadian Entomologist, are for me no more than trifling variants of *planiusculus*, which in its western forms approaches uncomfortably close to the more northern representatives of *vilis*. Of *falsificus* and *compertus* I have seen authentic specimens. They are quite inseparable from examples in my *planiusculus* series, lying on the *vilis* side of the type but merging insensibly into the typical form. Of *brumalis* I have seen no authentic examples but a careful reading of the description offers nothing to convince me of its specific distinctness from *planiusculus*.

AGABUS PSEUDOCONFERTUS Wallis, and A. PALUSTRIS Wallis

These are respectively the same as *A. gelidus* Fall, and *A. kenaiensis* Fall. This synonymy has been known for some time to Mr. Wallis and myself and he may have published it, but if so I cannot locate it and the Leng Supplements did not get it.

PLATEROS COLUMBIENSIS Brown

This is *P. californicus* Van Dyke according to Mr. Hopping,

who writes that he had a specimen of *columbiensis* compared with Van Dyke's type.

HELMIS CRYOPHILUS Musgrave

This is *H. immunis* Fall; identity established by means of a paratype of *cryophilus* communicated by Mr. Musgrave.

HELMIS SOLUTUS Brown (*Can. Ent. 1933, p. 46*)

This is the maculate form of *H. concolor* Lec., specimens of which vary greatly in color from conspicuously marked with yellow to entirely black. There seem to be no accompanying structural variations.

LIMNIUS SUBARCTICUS Brown

A paratype from Mr. Brown proves this to be *L. tardellus* Fall.

AULONIUM BIDENTATUM Fab.

A series of specimens in my collection from Santa Rosa, Lower California, collected I think by Mr. G. Beyer, prove to be this species; comparison being made with an authentic example sent me by Mr. Arrow of the British Museum. The species must be added to our list.

MACROPOGON DUBIUS Brown, M. CRIBRICOLLIS Brown

The former is the male of *M. piceus* Lec., and the latter almost certainly the female of *M. testaceipennis* Mots. Mr. Brown was unaware of the fact (as also was Dr. Horn) that the differences in the lengths of joints 2-4 of the antennæ are sexual rather than specific; these joints being very short and equal in the male, and somewhat longer and unequal in the female. His differentiation of the species was therefore erroneous. The notion that *testaceipennis* and *piceus* are respectively male and female of one species has been broached in some quarters, but this cannot be true as I have both sexes of each.

LIMONIUS KNULLI Fall (*Can. Ent. 1933, p. 229*)

This is not distinct from *L. æger* Lec. I am indebted to Mr. Brown for suggesting this synonymy; the error is inexcusable.

LIMONIUS OVATUS Knull (*Ent. News, 1934, p. 9*)

This does not differ appreciably from *L. sinuifrons* Fall, as determined from a paratype sent by Mr. Knull for comparison.

Attention has not been called I think to the absurd association under one name of *Athous limbatus* Lec., *A. simplex* Lec., and *A. scissus* Lec. in the Leng list. This astonishing bit of synonymy seems to have originated with O. Schwarz in Genera Insectorum and is a fair sample of this author's unfamiliarity with our fauna. The three species are perfectly distinct as every American student of the Elateridæ knows.

AGRIOTES ARCANUS Brown (*Can. Ent. 1933, p.178*)

This is the species which we understand, and I think correctly so, to be the *isabellinus* of Melsheimer, although a recent search failed to reveal anything under this name in either the Melsheimer or the Le Conte collection. *Isabellinus* is a quite distinct species and not a variant of *oblongicollis* as now given in the List.

DRASTERIUS INCONGRUUS Fall (*Jour. N. Y. Ent. Soc., 1934, p. 12*)

On a recent visit of Mr. W. J. Brown of Ottawa he recognized my type of this species as the *D. debilis* of Le Conte, the type of which he had recently examined. It was difficult for me to accept this identification, but I have since verified it at Cambridge. Here I was misled by several inaccuracies in Le Conte's description of *debilis*, which states that the thorax is one-half longer than wide and with the hind angles sharply carinate. In my type of *incongruus* the thorax is scarcely measureably longer than wide and the hind angles are virtually non-carinate; the color too is quite different from that of the Le Conte description. Mr. Brown writes me that in a series of a dozen or so examples in their collection the color varies very greatly.

ACMÆODERA LINEIPICTA Fall

In the March number of Entomological News, 1934, p. 62, Dr. Van Dyke expresses the opinion that this species is "probably a synonym of *biedermanni* Skinner". As a matter of fact the two species have nothing to do with each other. Dr. Van Dyke writes me that his mistake was due to a misidentified

specimen purporting to be *lineipicta*. *A. nigrovittata* Van Dyke, described in the article above cited, is practically identical with *lineipicta* in size, color and markings, differing scarcely at all except in being of stouter more parallel form, which the Doctor assures me is constant throughout his series.

CRYPTOCEPHALUS APICIDENS Fall

This is not separable from *C. amatus* Hald.

ANTHONOMUS BACCHARIDIS Pierce

This is an *Epimechus* and seems to be identical with *arenicolor* Fall.

The following two Mexican species have been taken in Southern Arizona by Mr. H. K. Duncan and should be added to our List.

AGÆOCERA GIGAS L. & G. (Buprestidæ)

MONACHULUS (MONACHUS) SCAPHIDIOIDES Suffr. (Chrysomelidæ)

A NEW VARIETY OF CICADA

For the past several years the writer has been collecting an orange colored cicada in the vicinity of Fairfield, Solano County, California, which is similar in color to *Okanagana arboraria crocea* Wymore but agrees morphologically with *O. triangulata* for which the name ***O. triangulata crocina*** is now proposed.—F. H. Wymore.

A CHANGE OF NAME

My attention has been called to the fact that Col. Casey used the name *Buprestis contorta*.[1] Therefore my species described under the name *B. contortae*[2] will not hold, as the name is preoccupied, although now in the synonymy. I am therefore changing the name to ***Buprestis murrayanæ*** R. Hop.—Ralph Hopping.

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[1] April 28, 1899. Studies in the American Buprestidae, p. 95.
[2] 1933, April, Pan-Pac. Ent., Vol. IX, No. 2, p. 84.

NEW SPECIES OF NORTH AMERICAN WEEVILS IN THE FAMILY CURCULIONIDÆ, SUBFAMILY BRACHYRHININÆ

BY EDWIN C. VAN DYKE

University of California, Berkeley, California

TRIBE OPHRYASTINI

Sapotes longipilis Van Dyke, new species

Elongate, fusiform, densely covered with gray scales, those of the rostrum, a lateral band on either side of prothorax and elytra and undersurface lighter in color, a pearly white or even faintly greenish, elytra in addition sprinkled with small patches of dark brown scales, the upper surface also sparsely clothed with rather long semierect setæ. Head convex above, front flattened and continuous with rostrum without evident transverse basal rostral impression, a few fine, deep, sparsely placed punctures on both front and rostrum, as well as a limited number of much inclined setæ, the rostral grooves finely impressed though with margins poorly defined because of the scales, and the eyes large, coarsely granular and much flattened. Prothorax evidently broader than long; base transverse; apex slightly arcuate; sides broadly rounded, somewhat constricted in front; disk rather deeply, moderately closely and coarsely punctured, though rarely approximately, with well defined though interrupted median longitudinal groove extending from base to beyond middle, and with a limited number of rather long, semierect setæ scattered over the surface. Elytra elliptical, the base extended forward like a collar and the apex pointed; striæ not defined but the serial punctures fine, regular, closely placed in front and much finer and more widely placed behind; intervals flat, each with a series of widely spaced, fine punctures, from which arise moderately long, white or brown, much inclined setæ. Beneath clothed with very large opalescent scales and a few widely spaced short setæ. Anterior tibiæ finely serrate along inner face, third tarsal segment distinctly wider than second and bilobed. Length 5.5 mm., breadth 2.5 mm.

Holotype (No. 3888, C. A. S. Ent.) and three paratypes, two from my collection and two from Dr. Blaisdell's collection, all collected at the same time by H. F. Wickham at Winslow, Ariz.

Colonel Casey was in error in stating, while defining the genus, that it had "non-fimbriate ocular lobes". In a fresh specimen of *puncticollis* Csy. from El Paso, Tex., the type locality, I find the ocular lobes with short but well developed fimbriæ. These

are also very evident in the four specimens of *longipilis*. To me the most distinctive feature of the genus is the arching of the lateral rostral sulci above, well marked in both species. *Sapotes longipilis* differs from the type species in its generally narrower and less robust form, the absence of a transverse depression at the base of the rostrum, in its long setæ, the finer rostral sulci and head punctures, the much finer and irregular pronotal punctures—coarse, deep and reticulate in *puncticollis*—, the much finer strial punctures of the elytra and in having both elytra and undersurface clothed with rather large and overlapping scales. My type specimen has the basal area of the third and fifth elytral intervals ornamented with white scales, present though less conspicuous in the paratypes.

Eupagoderes simulans Van Dyke, new species

Moderately elongate and somewhat robust, black, densely clothed with bluish gray scales intermixed with a few black, and arranged in a tessellated manner, except at the sides of the rostrum, in a median longitudinal and lateral band on each side of the pronotum where they are more generally black in color, and on the even numbered elytral intervals where they are somewhat fulvous. Head with front moderately convex with a shallow transverse impression at base of rostrum; rostrum rather short, very broad and thick and markedly arched at apex, the three sulci deep and extending to front. Prothorax about a fourth broader than long, sides shallowly arcuate, the disk with deep median groove and a few coarse, irregularly placed punctures, larger and closer at sides and finer on propleuræ. Elytra over three times as long as prothorax, elliptical, the males narrower than females as usual; striæ fine but generally well impressed and with somewhat coarse punctures, the intervals generally slightly convex, with the even ones somewhat narrower as a rule and darker in color and with the fine setæ more conspicuously displayed. Legs only moderately robust; apex of hind tibiæ obliquely rounded on outer side, not truncate; third tarsal segment but little broader than preceding even in males and with elliptical lobes; the terminal segments suddenly dilated beyond their necks giving them a bottle shape. Male length 11.5 mm., breadth 5.5 mm.; female, length 12 mm., breadth 6 mm.

Holotype male (No. 3889), and allotype female (No. 3890, C.A.S. Ent.) and numerous designated paratypes from a series of forty specimens in the collection of the California Academy of Sciences, all collected by J. O. Martin at Allamore, Tex., July

2, 1930. I have also seen many more from other localities in Texas.

This species like others in the genus is quite variable in size and somewhat unstable as to color pattern. I have selected as types specimens of intermediate size and of the most characteristic color pattern. Some specimens are of a more uniform gray with only the black striæ contrasting while others are a bit ocellate. It is evidently a common species in various parts of Texas and has no doubt been confused with *dunnianus* Csy. The latter is most certainly a synonym of *decipiens* Lec. I have typical *dunnianus* from El Paso, Tex., the type locality, which are in absolute agreement with Casey's description and which cannot be separated from specimens of *decipiens* checked with the LeConte type. The flattened surface of the front in *decipiens*, continuing in the same plane on to the rostrum without transverse basal impression, and the absence of the median rostral sulcus readily separates this species from *simulans*. The latter, however, closely simulates *geminatus* Horn, a species dwelling in a region fully a thousand miles distant from its own territory, both as regards general size and form as well as color pattern. *Simulans*, however, differs fundamentally from *geminatus* by having a rostrum that is decidedly more robust in every regard, broader, almost twice as thick, with the apex markedly depressed, the rostral sulci coarser and the eyes a bit more convex; prothorax less broad, more convex and more coarsely sculptured; elytral striæ generally deeper and the strial punctures coarser; legs decidedly less robust, the posterior tibiæ with the apex obliquely rounded, not truncate as in *geminatus* and *varius*; third tarsal segment in males but moderately dilated with the lobes elliptical, not broadly dilated and with lobes somewhat triangular; the terminal tarsal segments suddenly enlarged beyond neck or bottled shaped, not gradually enlarged as in *geminatus*.

Eupagoderes ocellatus Van Dyke, new species

Rather large, somewhat elongate and robust, black, densely clothed with small scales arranged in a tessellated manner, those of the entire under surface, legs and upper surface except as noted beyond of a pearly gray color; those of a narrow median longitudinal and of a broad stripe on each side of the pronotum black; those forming a broad, irregular and more or less inter-

rupted stripe along the course of the elytral striæ also black, while massed around the elytral strial punctures are golden brown scales, sometimes absent; in addition small arcuate setæ are to be found scattered over the surface. Head with front convex with a shallow transverse impression at the base of the rostrum; rostrum robust, broader in the female; rather abruptly depressed at the apex with median sulcus pronounced, the lateral less sharply defined. Prothorax about a fourth broader than long, sides broadly arcuate, anterior margin feebly arcuate and but little produced; disk with a shallow but distinct median groove, coarsely, deeply and irregularly punctured, more confluent at sides and finer and more distant on propleuræ. Elytra about three times the length of prothorax, oval; striæ fine, distinctly impressed, with somewhat coarse punctures, the intervals perceptibly convex and about equal breadth, the minute setæ hardly to be seen against the background of scales. Legs but moderately robust; apex of hind tibiæ truncate, with a broad oval area on outer side; third tarsal segment of middle and front legs rather broadly dilated and with elliptical lobes in the male, the terminal segments gradually dilated. Male, length 13 mm., breadth 5.5 mm.; female, length 14.5 mm., breadth 6 mm.

Holotype, female (No. 3891), allotype, male (No. 3892, C.A.S. Ent.), and one male and three female paratypes, collected by myself at Grand Junction, Colorado, June 12, 1926. I also have a depauperized female taken at the same time and a normal female from the California Academy collection, collected by J. R. Slevin at Thompson, Utah, June 1-5, 1913.

According to the Horn Key,[1] this species would follow *desertus*. By the Fall Key,[2] it would run close to *wickhami* with which it has no doubt been confused. From this last mentioned species, a practical paratype of which I have in my hands, *ocellatus* differs by being somewhat smaller, proportionally shorter and broader, with a variegated color pattern, *wickhami* being more or less of a unicolorous brown, with the scales moderate in size and arranged in a tessellated manner, not large and imbricated as in *wickhami*; it also differs by having the apex of the rostrum more suddenly depressed, the pronotum less produced apically, the disk more coarsely and irregularly punctured, the strial im-

[1] The Rhynchophora of North America by LeConte and Horn, Proc. Am. Phil. Soc., vol. 15 (1876), pp. 32-33.

[2] Miscellaneous Notes of North American Coleoptera, by H. C. Fall, Trans. Am. Ent. Soc., vol. 36 (1910), pp. 193-194.

pressions of the elytra weak and the strial punctures but moderately coarse, whereas the impressions in *wickhami* are deep sulci and the punctures are very coarse, the setæ also finer and less evident, and the third segment of the anterior tarsi not as wide in the males. The general facies of the two species is quite different. *Ocellatus* also resembles some of the larger specimens of *simulans* but can always be distinguished by having the apices of the hind tibiæ definitely truncate and the last tarsal segments gradually enlarged. The larger size, much longer afterbody, coarser pronotal punctures, less evident elytral setæ, and golden scales generally present around the elytral punctures will also assist in separating *ocellatus*. *Marmoratus* because of its size and maculate appearance might possibly be confused with *ocellatus* but it is readily separated by having no transverse impression at base of rostrum and the median rostral groove extending well onto the front; its elytral scales also overlap to a slight degree, many of its strial punctures are very coarse, and its posterior tibiæ are not truncated.

Eupagoderes setosus Van Dyke, new species

Small, moderately elongate, densely clothed with rather large opalescent scales having a pronounced rosy hue and with here and there irregular patches of brown scales, those of the afterbody imbricated or overlapping more or less, the elytra also with numerous, rather long, white, semierect setæ. Head with front convex; a rather deep transverse impression at base of rostrum, the latter robust, gradually arcuate to apex, the median sulcus linear but vague, the lateral linear, also poorly defined, and the setæ conspicuous especially on rostrum, though not as long as on elytra. Prothorax subglobular, slightly broader than long, apex moderately produced forwards, the sides broadly arcuate and constricted toward apex; disk very convex, with a shallow but linear median impression and a few minute, very irregularly placed punctures, each bearing a fine seta. Elytra elliptical, about two and a half times the length of the prothorax; striæ finely impressed and with fine, rather closely placed, elongate punctures; intervals flat, of equal breadth and with rather long irregularly biseriately arranged setæ. Legs moderately robust, the apices of hind tibiæ outwardly, obliquely narrowed, not truncate; third tarsal segment on all legs broadly and suddenly dilated and lobed, the terminal segments somewhat abruptly dilated beyond the shank. Length 7mm., breadth 2.75 mm.

Holotype, male, (No. 3893, C.A.S. Ent.) and paratype male, received from Charles Liebeck, the specimens bearing the locality label, Phoenix, Ariz.

This species may be recognized by its small size, the vague median rostral groove, the subglobular prothorax with the very convex, practically impunctate pronotum and the very conspicuous setiferous vestiture. In Fall's Key, it would run close to *mortivallis* Fall. It is, however, a very distinct species standing well apart from other members of the genus.

Eupagoderes huachucæ Van Dyke, new species

Medium sized, robust, densely clothed with black, brown and white scales arranged in a tessellated manner; head and sides of prothorax dominantly white; brown scales of pronotal disk more or less concentrated into two broad stripes, one on either side of the middle; disk of elytra clouded but mainly brown, the legs barred. Head with front feebly convex with a vague transverse impression at base of rostrum; rostrum very robust, distinctly trisulcate and evenly arcuate at apex. Prothorax almost a fourth broader than long, apex barely arched forwards, the base two-sevenths broader than apex, sides moderately arcuate, feebly sinuate near both apex and base, widest in front of middle; disk with a vague linear longitudinal impression at middle, chiefly defined by a series of fine punctures, and with a few, small punctures irregularly scattered over the surface. Elytra cordiform, broad at base with prominent humeral region; disk evenly convex with striæ clearly defined near base and apex only, elsewhere indicated by the rows of fine, well spaced punctures. Legs very robust, apices of hind tibiæ distinctly truncated on outer side, the third tarsal segment moderately enlarged and lobed and the terminal segment gradually enlarged outwardly. Length 13 mm. (with head extended), breadth 5 mm.

Holotype (No. 3894, C.A.S. Ent.), a unique, probably a female, collected by E. P. Van Duzee along the Babocomari River, Huachuca Mountains, Ariz., Aug. 8, 1924.

This species appears to me as more generalized and distinct than any of the previously described species. It has somewhat the appearance of *mexicanus* Sharp as indicated by the figure in the "Biologia Centrali-Americana" but differs from that by the dense scaly vestiture and by both pronotum and elytra having the punctures fine and sparse. Its generally even surface and the shape of the elytra also readily separates it from any species in our own fauna.

Eupagoderes halli Van Dyke, new species

Moderate in size, trimly built, densely clothed with rather large scales of a black, light brown or chalky white color which are arranged in a tessellated manner, the white scales dominating and almost entirely covering the sides and under-surface of the body, the brown forming an irregular sutural vitta, small irregular patches here and there on the elytra, chiefly posteriorly, and, in company with the black, two broad stripes on the pronotum, one on either side of the middle, while the black also form irregular patches which are scattered over the upper surface of the elytra. Head with front flat, on the same plane as the upper surface of the rostrum, the transverse impression at the base of the rostrum practically obsolete; median rostral groove linear and of normal length, the lateral also linear but short; rostrum depressed at apex and of but moderate robustness. Prothorax about a fifth broader than long, base almost a fifth wider than apex, the latter feebly arcuate; sides moderately rounded, sinuate and constricted towards base, feebly narrowed near apex; disk moderately convex and with small, deep punctures widely and irregularly scattered over the surface. Elytra cordiform; humeral area prominent, narrowed apically, the disk convex, rather evenly arcuate from base to apex; striæ fine, irregular and generally complete only at sides, the strial punctures fine and widely spaced, a few minute hooked setæ also observable, chiefly apically. Legs only moderately robust, apices of hind tibiæ distinctly truncate on outer side; third tarsal segment hardly wider than second; the terminal segments gradually enlarged. Length 9 mm., breadth 3.75 mm.

Holotype (No. 3895, C.A.S. Ent.), and four paratypes collected by H. N. Hultgren of the Ansel Hall Expedition of 1933 into northern Arizona and southern Utah. The first was found 19 miles S.W. of Kayenta, Navajo Co., Ariz., alt. 6500 ft., June 20, 1933, and the paratypes 23 miles west of Kayenta, alt. 6900 ft., June 23, 1933.

This species looks much like a smaller specimen of *huachucæ* and is no doubt very closely related to it. Its distinctive features are the more definite type of maculation, the flattened head and obsolete transverse post-rostral impression, the linear rostral grooves and, with *huachucæ*, the generally even upper surface, cordate body, prominent humeral region, fine striæ and distinctly tessellated arrangement of scales.

Tribe Tropiphorini

This tribe as constituted by Pierce,[3] undoubtedly belongs close to the Oprastini though it is a much less definite unit. The bulk of the species are to be found in western North America and most of them no doubt originated from stock having its origin in the great Northwest. There are many mistakes in the make up of the tribe as given in the Leng Catalogue. The following may be noted. *Cimbocera conspersa* Fall is not a variety of *pauper* Horn as stated by Pierce. It is a very distinct species as shown by the very broad rostrum, much narrower in *pauper*, as well as by other characters. *Cimbocera sericea* Pierce is but a weak race of *conspersa*. *Dichoxenus* should include not only *setiger* Horn but *Anametis setosus* Blatch. *Amotus* Csy. will have to be removed from the tribe and placed in the *Epicærini* with *Stamoderes* Csy., of which it is no doubt synonymous. The genus *Mimetes* Sch. as interpreted by Horn is probably the correct generic name for the genus which should supercede both. We will try to settle that by having comparisons made with the type. *Melbonus* Csy. will have to be dropped as the type species *scapalis* Csy. is a true *Epicærus* and very close to several species from southern Mexico. *M. denticulatus* Pierce is also an absolute synonym of *scapalis* Csy. as shown by a careful comparison made by Buchanan and myself. *Melamorphus* Horn has already been suppressed by me,[4] the included species being placed in *Dyslobus* Lec. The following new genera and species will have to be added to the tribe.

Genus **Pseudorimus** Van Dyke, new genus

Body densely scaly with head, prothorax and elytral declivity sparsely pilose; rostrum shorter than head, barely narrower at base than front between the eyes, subquadrangular, a transverse impression at base separating it from front, tip feebly emarginate and with nasal plate distinct and depressed but not sharply delimited; supports of mandibular deciduous pieces not prominent; scrobes deep, well defined, lateral, arcuate and passing rapidly inferior in front of eyes; antennæ rather long; scape long, rather suddenly clavate, sparsely pubescent, not squamose, reaching

[3] Miscellaneous contributions to the knowledge of the Weevils of the Families Attelabidæ and Brachyrhinidæ, by W. Dwight Pierce, Proc. U. S. Nat. Mus., No. 1988, vol. 45 (1913), p. 377.

[4] A short Review of Dyslobus LeConte, A genus of Broad-nosed Weevils of the Sub-family Otiohynchinæ with Descriptions of New Species, by Edwin C. Van Dyke, Pan-Pacific Ent., vol. IX (1) (1933), pp. 31-47.

posterior margin of eye; funicle seven-segmented, segments 1—2 each about three times as long as broad, 3—7 shorter and subclavate, seventh free, club oval, acute. Prothorax transverse, truncate at base, feebly emarginate at apex, sides distinctly arcuate, postocular lobes very feebly yet distinctly fimbriate. Scutellum short, transverse. Elytra elongate, oval, humeral area oblique, not angled, gradually attenuate posteriorly. Metasternum short, sides pieces indistinct, metaepisternal suture obliterated, intercoxal process feebly arcuate in front; second abdominal segment longer than the following two united, separated from the first by a broad and feebly arcuate suture. Femora subpedunculate; anterior and middle tibiæ mucronate at tip, the former denticulate within; hind tibiæ with corbels open; tarsi with third segment broad and bilobed and all densely pubescent beneath.

Genotype: *Pseudorinus granicollis*, new species,

This genus belongs near *Orimoderma* Lec. The general facies of the species is quite similar, particularly as regards the conspicuous scaly vestiture and general elongate form. They also dwell in the same zoo-geographical region and I believe originated from the same stock. The genus, however, has several markedly divergent features which seem to warrant its independent status. The most distinctive characters are that the scape of the antennæ is much longer, the funicular segments also longer, the post ocular lobes of the prothorax but poorly developed while prominent in *Orimoderma*, and the second abdominal segment separated from the first by a shallow and broadly arcuate suture, strongly arcuate and limited to the middle portion in the other. The front of the head in *Pseudorimus* is also flatter, the prothorax more transverse and with more strongly rounded sides, the scape pilose, not squamose as in *Orimoderma*, the tibiæ pilose above as well as squamose, and the head and apical declivity of the elytra ornamented with a limited amount of fine pile whereas the entire upper surface except the apex of the rostrum in *Orimoderma* is bare of pile though densely squamose.

Pseudorimus granicollis Van Dyke, new species

Elongate, narrow, black with appendages dark rufo-piceous, clothed with scales mostly of the body color though with scattered patches of a pearly color; scales of the head and prothorax somewhat dispersed, those of the elytra densely placed in a mosaic

manner while those of the underside of the afterbody and legs are somewhat sparse; rostrum, front, elytral declivity and undersurface also somewhat pilose, long about the mouth, short elsewhere. Head longer than prothorax; front flattened with a deep transverse impression at base of rostrum; the latter somewhat narrower than interocular space, quadrate, arcuate; upper surface of front and rostrum rather, finely, deeply, and somewhat closely and cribrately punctured; eyes quite prominent, projecting well beyond side margin of head. Prothorax at least a fifth broader than long; the front margin distinctly emarginate at middle; base margined at sides; sides somewhat straight and diverging from the constriction to beyond the middle, then arcuate and narrowed forwards with a slight constriction near front margin; disk moderately flattened with a faint median longitudinal ridge and finely, deeply, rather closely punctured, the punctures somewhat strigose and arranged in a more or less concentric manner, the intervening area also quite granular in appearance. Elytra two and two-thirds times length of prothorax, elongate oval, apex obliquely declivous; disk convex though a bit flattened at middle, the striæ distinct, finely impressed, with well marked, rather closely placed punctures; intervals broad and flat, the apical declivity sparsely, finely pilose. Undersurface more or less finely punctured though these are somewhat concealed by the scales. Length 13 mm., breadth 4.5 mm.

Holotype (No. 3896, C.A.S. Ent.), a unique specimen in my collection from Bearfoot Park,, Chiricahua Mts. Ariz., 8000-9000 ft. alt., collected July 15, 1927, by J. A. Kusche. The specimen is slightly injured, perhaps old. There is, therefore, a possibility that fresh specimens might have the forebody better clothed with scales. This species superficially resembles *Orimoderma protracta* Horn, which has also been collected in the same region, but can be easily separated because of its larger size, greater breadth, more prominent eyes, broader and granular pronotum, as well as by the distinctive generic characters.

Pseudorimus orbicollis Van Dyke, new species

Elongate, moderately narrow, rufo-piceous, appendages rufous; more or less densely clothed with bright opalescent scales throughout, which are arranged in a mosaic manner; head, pronotum and apical portion of elytra also sparsely pilose. Head nearly a third longer than prothorax, front flattened and, to a certain degree, continuous on the same plane as the upper surface of the rostrum, the transverse impression at the base of the rostrum being feeble; rostrum somewhat narrower than interocular area, quadrate, slightly arcuate in front; head and rostrum finely, deeply and

sparsely punctured, the punctures in most cases concealed by the scales; eyes large though much flattened as in *Orimoderma protracta* Horn; antennæ as described in generic description. Prothorax slightly more than a sixth broader than long; base transverse and finely margined at sides; apex feebly emarginate at middle; sides broadly, rather evenly arcuate from base almost to apex where vaguely constricted; disk quite smooth though punctured like the head. Elytra about three times the length of the prothorax and a third longer than broad; disk rather evenly convex, the striæ distinct though finely impressed with small, rather closely placed, deep punctures; intervals broad and flat. Undersurface finely, sparsely punctured, the punctures generally concealed by the scales, and very finely, sparsely pilose. Length 10 mm., breadth 4 mm.

Holotype (No. 3897, C.A.S. Ent.), collected by myself in the Santa Fé Canon, Santa Fé, N. Mex., July 23, 1926. A second but imperfect specimen is also in the California Academy of Sciences' collection, collected on Gallena Cr., Jemez Mts., N. Mex., at an altitude of 8500 ft., by J. Chamberlin, July 24, 1930.

This species is somewhat different in appearance from the preceding and superficially much more like *Orimoderma protracta* Horn, in fact probably confused with the same for both are to be found in the same region. Aside from the generic characters, it may be told from this by its flatter head and rostrum, more orbicular prothorax, broader, more cordate afterbody, more defined elytral striæ and fine punctures on head, pronotum and elytral declivity. From *Pseudorimus gravicollis*, it differs chiefly by its smaller size, less prominent eyes and non-granular pronotum.

Genus **Crocidema** Van Dyke, new genus

Body more or less densely clothed with scales as well as uniformly pilose; head with front somewhat flattened; rostrum at middle narrower than interocular area, subquadrate, separated from front by a more or less definite transverse impression, tip emarginate and with nasal plate fairly well defined; supports of deciduous pieces of mandibles not prominent; scrobes, deep, generally short, well defined, and passing rapidly inferior in front of eyes; antennæ rather long, scape quite suddenly clavate, sparsely pubescent, not squamose, and about reaching posterior margin of eye; funicle seven-segmented, segments 1—2 each about three times as long as broad, 3—7 shorter and subclavate, seventh free, club fusiform; eyes large though generally much flattened. Prothorax

transverse, truncate at base and apex; sides arcuate, post ocular lobes feebly developed though distinctly fimbriate. Scutellum distinct, short, and transverse. Elytra elliptical, humeral area oblique, not angled, apex pointed. Metasternum short, side pieces indistinct, suture obliterated; intercoxal process feebly arcuate in front; second abdominal segment a bit longer at middle than the following two segments united and separated from the first by a suture distinctly arcuated at middle. Femora subpedunculate; anterior and middle tibiæ mucronate at tip; femora at most obscurely denticulate within; hind tibiæ non-truncate at apex and with corbels open; tarsi with third segment broad, bilobed and densely pubescent beneath.

Genotype: *Crocidema californica*, n. sp.

This genus resembles both *Orimoderma* and *Pseudorimus* and with them forms a definite complex within the tribe. It differs from both superficially by being uniformly pilose as well as squamose. From *Orimoderma*, it diverges by having feeble post ocular lobes, prominent in *Orimoderma*, by having the scape longer, reaching to posterior margin of eye, only to anterior margin in the other, the prothorax transverse not subcylindrical, and the scrobes longer and more distinctly arcuate as a rule, than in *Orimoderma*. From *Pseudorimus*, it differs principally, aside from its general piloseness, by having the postocular lobes slightly better defined and the suture between the first and second ventral sclerites more distinctly and narrowly arcuate. It also somewhat resembles *Peritaxia* but this latter has the humeri rectangular and the mandibular supports of the deciduous parts prominent as well as possessing other divergent characters. As far as I can judge by the material at hand the genus is restricted to the southern part of the Great Basin and the mountains adjacent.

Key to Species

1. Rostrum very robust, almost as broad at base as at apex, transverse impression quite evident; post ocular lobes distinct; elytral striæ finely, sharply impressed. San Bernardino Mts., Calif. ..... *californica* n. sp.
—. Rostrum distinctly narrower at base than apex 2
2. Median funicular segments almost twice as long as wide. Northern Ariz. ..... *nigrior* n. sp.
—. Median funicular segments but little longer than wide 3
3. Transverse impression at base of rostrum very feeble, the flattened front on practically the same plane with upper sur-

face of rostrum; postocular lobes feeble but evident.....
.....*planifrons* n. sp.

—. Transverse impression at base of rostrum deep, upper surface of rostrum arcuate, post ocular lobes very feeble.....4

4. Rostrum much longer than broad, scaly vestiture black, pile of a double type and rather fine. Southern Utah.....
.....*attenuata* n. sp.

—. Rostrum almost as broad as long, scaly vestiture to a great extent pearly white; pile of a single type, short, semierect, scattered setæ.....*albovestita* n. sp.

Crocidema californica Van Dyke, new species

Elongate, narrowed in front and behind; black with antennæ, tibiæ and tarsi somewhat rufous; densely clothed with scales that are dark but have an irridescent or pearly lustre and are arranged in a tessellated manner; head distinctly setiferous; pronotum provided with short upright hair; elytra clothed with sparse, elongate, somewhat inclined hair, the rest of the body also quite pubescent. Head longer than prothorax; front somewhat flattened, a distinct transverse impression at base of rostrum; rostrum fully 2 mm. long, as wide at base as interocular space and but slightly wider apically, the alæ being but little expanded, feebly, broadly, longitudinally sulcate at middle and depressed at apex, a small fovea between the eyes with a smooth line continuing forward from it; scrobe short, broadly opened behind and arcuate; scape reaching posterior margin of eye; funicular segments 1—2 each three times as long as broad, segments 3—7 clavate and twice as long as broad; eyes large, subangular below, and much flattened. Prothorax about a sixth broader than long, base and apex truncate, sides evenly but moderately rounded from base to just before apex where slightly constricted; disk convex, finely and sparsely punctured, the punctures generally concealed by scales. Elytra elliptical, about two and a half times as long as prothorax; less than twice as wide as long in female and about twice as wide in males with apical declivity abruptly rounded, the striæ finely, sharply impressed in females, broader and deeper in males and with distinct, rather closely placed punctures; intervals rather broad and flat in females, narrower and a bit convex in males; clothed throughout with both scales and hair, the latter sparse, both long and short and somewhat obliquely inclined. Undersurface finely, sparsely punctured, squamose and finely pilose, the last ventral segment with a deep circular impression in the female and a broader and flatter impression in the male. Female, length 11 m.., breadth 4 mm.; male, length 10 mm., breadth 3.25 mm.

Holotype, female (No. 3898), allotype, male (No. 3899, C.A.S. Ent.), and three paratypes. The first was collected by myself

at Idlewild, Mt. San Jacinto, Cal., July 2, 1928; the second on Mt. San Jacinto, Cal., July, 1912, by J. C. Bridwell; the others at Forest Home, San Bernardino Mts., June 13, 1928, by myself, the San Bernardino Mts. in Aug., and on Mt. San Jacinto, about 9000 ft., July 19, 1912, by J. C. Bridwell. Numerous other specimens have been seen. This is a species that has been well known to me for many years. It appears to be restricted to the San Bernardino range of mountains of southern California. In many old collections it has been mixed with *Orimoderma protracta* Horn.

Crocidema nigrior Van Dyke, new species

Elongate, narrowed in front and behind, black, densely squamose and pubescent, the scales generally of the body color though here and there as on the legs and undersurface of an opalescent hue; hair of the head long, of the pronotum sparse, rather short and erect and of the elytra mixed long and short and suberect. Head longer than prothorax, front somewhat flattened, transverse impression at base of rostrum shallow but quite evident; rostrum less than 2 mm. long, somewhat narrower at base than apex, feebly, broadly sulcate at middle and arcuately depressed at apex, a small fovea between the eyes and a fine line continuing forward from it; scrobe short, arcuate and wide behind; funicular segments 3—7 clavate and fully twice as long as wide; eyes large, flattened and slightly angulated below. Prothorax a sixth wider than long, base and apex truncate, sides broadly rounded, somewhat narrowed forward and feebly constricted before apex; disk convex, surface granular because of scales, finely, sparsely punctured and sparsely pilose. Elytra elliptical, less than two and a half times as long as prothorax and slightly more than a third longer than broad; disk somewhat flattened, abruptly arcuate at elytral declivity; striæ shallow but not sharply impressed and with somewhat coarse, rather close punctures; intervals slightly convex; general surface squamose and pilose, the pile consisting of sparse longer hair mixed with more numerous shorter hair. Undersurface as in *californica*. Length 10 mm., breadth 4 mm.

Holotype female (No. 3900, C.A.S. Ent.), and two paratype females from a set of six specimens, all collected by myself on the south wall of the Grand Canon, Ariz., near El Tovar, July 27, 1926. The three specimens not included as types are somewhat smaller than the type set but otherwise the same. Two other specimens in the Academy collection have also been seen. These were collected by H. N. Hultgren on the Ansel F. Hall Ex-

pedition of 1933, to northern Arizona and southern Utah, one specimen found at Rainbow Lodge, Navajo Mt., Coconino Co., Ariz., alt. 6500 ft., July 14, 1933, the other 15 miles W.N.W. of Kayenta, Navajo Co., Ariz., alt. 7200 ft., June 24, 1933. These specimens are exactly like those collected by myself.

This species is closely related to *californica* but is somewhat smaller, proportionately shorter, with the rostrum narrower and generally less robust, the prothorax narrower, the elytra more evenly arcuate at sides, the elytral declivity more abrupt, the strial punctures coarser, the body darker and the pile denser.

Crocidema planifrons Van Dyke, new species

Elongate, narrowed in front and behind, dark rufo-piceous, densely clothed with rather large bronzed scales and pubescence; hair of head and pronotum moderately long and much inclined, that of the elytra long, light fulvous and semierect. Head about a third longer than prothorax; front much flattened; transverse impression at base of rostrum quite feeble, the front and upper surface of rostrum as a result about on the same plane; rostrum 1.5 mm. long, narrower at base than at the depressed apex, a feeble fovea between the eyes; scrobe short, arcuate and wide behind; funicular segments 3—6 obcordate and each less than twice as long as wide; eyes large, slightly convex and oval in outline. Prothorax a fifth wider than long, base truncate, apex feebly emarginate, sides well rounded at middle, somewhat oblique, straight and convergent towards base and apex; disk a little flattened and sparsely, finely punctured. Elytra elliptical, almost three times as long as prothorax and considerably less than twice as long as broad; disk convex, a bit flattened forwards, evenly arcuate from middle to apex; striæ fine, distinctly impressed and finely, closely punctured, the intervals feebly convex apically, the pile more or less uniform in length. Undersurface as in preceding species. Length 9 mm., breadth 3.5 mm.

Holotype (No. 3901, C.A.S. Ent.), and paratype in my collection, collected in the Chiricahua Mts., Cochise Co., Ariz., Mch. 11, 1917, by Virgil W. Owen. There is also a third specimen in the Blaisdell collection, bearing the label, Ariz., April 14, 1916.

This species may be recognized by its moderate size, narrow form, the light bronze scaly vestiture with scales of fair size, the single type of pilosity, short median funicular segments and by the flattened head and short rostrum, distinctly shorter than in either of the preceding species.

Crocidema attenuata Van Dyke, new species

Elongate very much narrowed especially anteriorly and posteriorly, black, densely clothed with scales of moderate size and of body color, and conspicuously pilose; hair of the elytra longer and of a double type, a few scattered, very long, erect hairs, arising from amongst the more numerous shorter, white, somewhat inclined ones. Head longer than prothorax, front slightly convex, transverse impression at base of rostrum pronounced; rostrum 1.75 mm. long, its base subcylindrical and much narrower than apex, gradually arcuate from basal impression to apex, a deep interocular fovea, the post ocular lobes quite feeble; scrobe well defined, but little widened behind, somewhat long and only slightly arched, funicular segments 3—6 obcordate and each less than twice as long as wide; eyes fairly large, feebly convex, broadly oval. Prothorax a fifth wider than long, broadest in front of middle, base and apex truncate, sides slightly rounded; disk convex and finely, sparsely punctured. Elytra elongate elliptical, pointed behind, three times the length of the prothorax and considerably less than twice as long as wide; disk convex, arcuate towards apex but declivity rather abrupt; striæ fine, moderately coarsely, closely punctured, the intervals flat, the odd ones perceptibly narrower than the even. Undersurface as in preceding species. Length 9.5 mm., breadth 3.25 mm.

Holotype (No. 3902, C.A.S. Ent.), a unique in the collection of Dr. F. E. Blaisdell, collected at Zion National Park, Utah, May 17, 1922, by Vasco M. Tanner.

The distinctive features of this species are its narrowness, deep transverse impression at base of rostrum, somewhat narrow, subcylindrical rostrum, evenly arcuate upper surface of basal area, rather long and less arched scrobes, and very feeble post ocular lobes. It simulates *nigrior* in color and double type of elytral pile, and *planifrons* in type of antennæ. It might possibly be taken for the male of *nigrior* but the distinctive type of rostrum, antennæ, and scrobes as well as much reduced post ocular lobes should prevent that.

Crocidema albovestita Van Dyke, new species

Narrow, elongate, black, densely clothed with rather large scales which are in the main of a pearly white color, arranged in a tessellated manner, and with rather short, semierect setæ sparsely scattered over the body, except on the front of head where they are denser and longer. Head slightly longer than prothorax, front somewhat convex, transverse impression at base

of rostrum well marked; rostrum broad, barely longer than broad, somewhat narrower at base than apex and than front, and arcuate from basal impression to apex, scrobes well defined, short, widely opened behind; funicular segments 3—6 transverse; eyes moderately large, elliptical and feebly convex. Prothorax about a fifth wider than long, base truncate, apex feebly arcuate, sides well rounded, faintly contricted near apex, post ocular lobes distinct though feeble, the disk convex and with setæ more inclined than on elytra. Elytra fusiform, two and a half times length of prothorax and about twice as long as broad; disk convex, somewhat flattened from scutellum to apex of declivity, thence evenly rounded to straight and oblique declivity. Striæ fine, rather finely, not closely punctured, intervals flat and, except for the narrow sutural, about equal in breadth. Undersurface similar to preceding. Length 8 mm., breadth 2.75 mm.

Holotype (No. 3911, C.A.S. Ent.), a unique collected by H. N. Hultgren on the Ansel F. Hall Expedition of 1933, to northern Arizona and southern Utah. It was taken 19 miles S. W. of Kayenta, Navajo Co., Ariz., alt. 6500 ft.

This, the smallest species of the genus, is readily separated from its fellows by its light color, sparse, short setæ and other characters mentioned in the key.

AN INTERESTING NEW FULGORID (HEMIPTERA)

BY E. P. VAN DUZEE

Loxophora dammersi Van Duzee, n. sp.

Allied to *transversa* V.D. from Utah but at once distinguishable by the large polished black callous on the base of the vertex. Pale greenish, transversely banded with fuscous and white. Length, 4 mm.

Head a little longer than in *transversa*; vertex narrower, its base largely occupied by a large round polished black callous resting on its base; front nearly parallel, 5-carinate, the median and intermediate carinæ connivent at apex of head in a polished area that sends a single carina on to the apex of the vertex; frontal fovæ deep, the lateral carrying two rows of pustules which become three on their superior aspect next the vertex; hind margin of pronotum nearly straight; propleural callous very large and conspicuous. Elytra scarcely reaching to middle of tergum, its vena-

tion less distinct than in the allied species. Anterior and intermediate femora foliaceous, as broad as the front, their tibiæ flattened, the anterior slightly expanded. Lateral compartments of front, pronotum, sides of propleuræ, lateral angles of scutellum and sides of abdomen pustulate.

Color greenish white, tinged with yellow on scutellum and tergum; dorsum crossed by a broad brown band covering anterior one-half of the elytra nearly to base; tergum with deeper brown basal and subterminal bands; legs varied with brown; basal callous and four points on vertex, two points next the eyes, the large propleural callous, cheeks between the eyes and antennæ and a broken band across the front connecting these areas, deep black; apex of clypeus, two basal and two smaller apical spots on the labrum brown; coxæ, legs and pleural pieces varied with brown; hind tibiæ with six or seven black spines.

Holotype, female, No. 3894, Calif. Acad. Sci. Ent., and seven female paratypes, taken by Commander C. M. Dammers on the east slope of the San Jacinto Mountains, California, along the "Pines to Palms" highway, six on October 10th, the others about two weeks earlier. All were taken from Agave which may quite likely be their food plant. That six only were taken in a full day's hunt, and those all females, would indicate that their season was earlier, when males probably would have been found with the females. It is perhaps a rare species and local in its distribution. It gives me pleasure to dedicate this, one of the most beautiful of our little Fulgorids, to its discoverer, who is doing most valuable work in the rearing of our Californina Lepidoptera.

Dr. Ball has recently sunk my *transversa* as a synonym of *Ticida cingulata* Uhler but it is quite distinct. The genus *Loxophora* may, I think, also stand, on account of the foliaceous anterior femora which are found in both *transversa* and *dammersi* but not in *Ticida*.

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