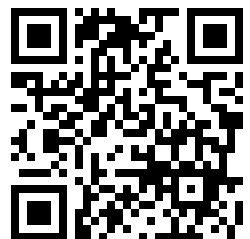


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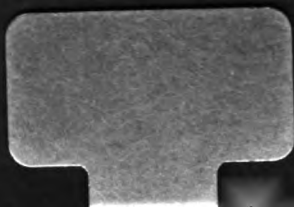
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BULLETIN OF THE DEPARTMENT OF

GEOLOGY

Vol. 5, No. 12, pp. 207-215, Pls. 15-16

ANDREW C. LAWSON, Editor

QUATERNARY MYRIOPODS AND INSECTS  
OF CALIFORNIA

BY

FORDYCE GRINNELL, Jr.

BERKELEY

THE UNIVERSITY PRESS

May, 1908

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CONTENTS.

	PAGE
Introduction .....	208
Myriopoda .....	209
<i>Julus occidentalis</i> , n. sp. ....	209
<i>Julus cavicola</i> , n. sp. ....	210
<i>Spirobolus australis</i> , n. sp. ....	210
Coleoptera .....	211
<i>Platynus conf. funebris</i> LeConte .....	211
<i>Amara insignis</i> Dej. ....	211
<i>Pterostichus</i> , sp. indet. ....	211
<i>Calosoma semilaeve</i> LeConte .....	211
<i>Dytiscus marginicollis</i> LeConte .....	212
<i>Coniontis robusta</i> Horn .....	212
<i>Coniontis abdominalis</i> LeConte .....	212
<i>Coniontis puncticollis</i> LeConte .....	212
<i>Coniontis elliptica</i> Casey .....	213
<i>Eleodes acuticauda</i> LeConte .....	213
<i>Eleodes acuticauda, forma punctata</i> , LeConte .....	213
<i>Eleodes behrii</i> , n. sp. ....	213
<i>Eleodes consobrina</i> LeConte .....	214
<i>Eleodes laticollis</i> LeConte .....	214
<i>Eleodes intermedia</i> , n. sp. ....	215
<i>Eleodes elongata</i> , n. sp. ....	215

## INTRODUCTION.

In the recent work of exploration of the limestone caves of Shasta County, California, by Dr. J. C. Merriam, Dr. Wm. J. Sinclair and Mr. E. L. Furlong, the primary object was the investigation of the vertebrate faunas, but specimens of other forms, including a few myriopods, were obtained from both caves. During investigations in the asphalt beds near Los Angeles two beetles and several myriopods were found by Mr. Furlong, previous to December 1906, when the author joined Dr. Merriam and Mr. Furlong, and succeeded in making a small, but interesting collection of *Coleoptera* and *Myriopoda* from the vicinity of the bones in the asphalt. The author is greatly indebted to Dr. Merriam for the opportunity of studying this material, as well as the cave specimens from Shasta County.

Samwel Cave and Potter Creek Cave are located on the McCloud river in Shasta county. Samwel Cave<sup>1</sup> is fifteen miles above Baird. It lies in the belt of Carboniferous limestone exposed along the lower McCloud river. There are recognized in the deposits on the floor of this cave twenty species of vertebrates of which eight are extinct. The species from the different chambers are in some cases distinct, suggesting slightly different ages.

Potter Creek Cave<sup>2</sup> is situated on the McCloud river near Baird. It contains, so far as recognized, fifty-two species of vertebrates, of which twenty-one are extinct. Dr. Sinclair considers the fauna of Potter Creek Cave to represent the middle or later Quaternary; that of Samwel Cave is Quaternary, but later than that of Potter Creek Cave. The Myriopods from Potter Creek Cave surely indicate an earlier formation. Mr. Furlong has explored Samwel Cave and Dr. Sinclair has explored Potter Creek Cave, and the notes here given are taken from their papers. Dr. Merriam has compared the ages of the different caves of Shasta county, in a recent paper.<sup>3</sup>

<sup>1</sup> Furlong, E. L. The Exploration of Samwel Cave. *American Journal of Science*, XXII, 1906, pp. 235-247.

<sup>2</sup> Sinclair, Wm. J. The Exploration of the Potter Creek Cave. *Univ. Calif. Publ. Amer. Arch. and Ethn.*, Vol. II, No. 1, 1904.

<sup>3</sup> Merriam, J. C. Recent Cave Explorations in California. *American Anthropologist* (n. s.), 8, No. 2, 1906.

The asphalt beds<sup>4</sup> at Rosemary, near Los Angeles, cover a considerable area. Bones are scattered through the whole deposit, but in uneven numbers, and the beetles and myriopods were found in the neighborhood of the bones. Blake in his expedition through California in the early days noticed the bitumen lakes or tar springs, and similar ones are still found in the same region. The remains of the animals we find are of those which were entrapped in these tar springs. And if we note the preponderance of the family Tenebrionidae which come out from their hiding places in the evening to forage, their presence can readily be accounted for. One might expect to find carrion beetles, *Silphidae*, but when one reflects, it can readily be seen that if an animal has sunk out of sight, as it surely does in these tar springs, it is shut out from the air and no odor could attract carnivorous animals or insects. The plausible explanation is that insects just wandered or flew in by mistake; and the forms found certainly bear out this conclusion. The age of these beds is Quaternary. The great resemblance of the insects to those now living, in most cases amounting to identity, shows that it takes a long time to effect a change in the Coleoptera.

The writer's thanks are due Dr. F. E. Blaisdell and Dr. E. C. Van Dyke of San Francisco for assistance in the identification of the Coleoptera.

All of the drawings were executed by Miss Julia D. E. Wright of Palo Alto.

#### MYRIOPODA.

##### JULUS OCCIDENTALIS, n. sp.

Pl. 15, figs. 9 and 11.

Type specimens Nos. 10005 and 10006, Univ. Calif. Col. Invert. Palae. Samwel Cave, Shasta Co., Calif.

There are two fairly complete remains of this myriopod, besides some remains and fragments of others on a larger block. Both are coiled, one completely. The segmentation is very plain, and fairly constant in width; the intersegmental ridge is very pronounced, and high. The ventral furrow is comparatively

<sup>4</sup> Merriam, J. C. Recent Discoveries of Quaternary Mammals in Southern California. *Science* (n. s.), Vol. XXIV, pp. 248-250, 1906.



large and deep, at least in one specimen, the stalagmitic covering obscures it somewhat.

This is smaller and more slender than any form heretofore known in California; the wide and deep ventral furrow is also a striking feature. It has some resemblance to *Julus antiquus* Heyden.

Length .....	86-109 mm.
Width .....	6
Width of segments .....	1.5

*JULUS CAVICOLA*, n. sp.

Pl. 15, figs. 1, 5, 10, and 12.

Type specimen No. 10007, Univ. Calif. Col. Invert. Palae. Potter Creek Cave, Shasta Co., Calif.

There are three separate parts of this myriopod, besides another buried in the block in the stalagmitic covering, and several other smaller pieces and segments. This species is quite different from the Samwel Cave species in several particulars. The ventral furrow is very much reduced in size and hardly noticeable—about 9 m.m. wide on an average. The segments are not so arched or the intersegmental ridge so protruding and very inconspicuous.

Length .....	15-20 mm.
Width .....	5.5-6
Width of segments .....	1

*SPIROBOLUS AUSTRALIS*, n. sp.

Pl. 15, figs. 13 and 14.

Type specimens Nos. 10008 and 10009, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

There is one well preserved fragment embedded in a lump of asphalt, besides a few scattering, isolated segments. This species bears a resemblance to *Spirobolus hebes* Bollman, from Southern California. In *S. australis* the middle of each segment is marked by a well defined furrow. The surface is smooth and shining generally, but in a few places it is very finely punctate. No ventral furrow or a very slight one. The specimen number 10009 I place here under this species as the probable early stage.

It was found in the same place, and bears characteristics that would mark it as an early stage. It is 5.5 m.m. long, 2.5 m.m. wide, segments 1 m.m. wide. It is light brown in color, with a darker shade along the median sulcus. The species is very close to the living form.

Length of fragment .....	13 mm.
Width .....	10
Width of segments .....	3.75

### COLEOPTERA.

#### PLATYNUS conf. FUNEBRIS LeConte.

Specimen No. 10010, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

A single elytron is present in the collection, and is probably referable to the common species, *P. funebris* Lec. This genus is well represented on the West Coast at the present time by common and closely allied species.

#### AMARA INSIGNIS Dej.

Pl. 16, fig. 17.

Specimen No. 10011, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

There are two well preserved and perfect elytra in the collection, agreeing exactly with living forms; belonging to a group, well represented, and common in California.

#### PTEROSTICHUS, sp. indet.

Specimen No. 10012, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

There are several elytra of this common but difficult genus, which are hardly determinable with our present knowledge.

#### CALOSOMA SEMILAEVE LeConte.

Pl. 16, fig. 26.

Specimen No. 10013, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

A beautifully preserved elytron of this characteristic and common Californian species enables us to leave no doubt as to the determination of this species.

## DYTISCUS MARGINICOLLIS LeConte.

Pl. 15, fig. 6.

Specimen No. 10014, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

Two elytra of this species are fairly well preserved, but are crushed and flattened, so that the determination was at first difficult. This is one of the water beetles, which are found in the vicinity of streams and ponds throughout our region. They are strong flyers and frequently come to electric lights in the city. It can readily be imagined that this specimen which has been preserved to us was flying over the country in search of a pool or stream, and mistook the tar spring for a pool of fresh water.

## CONIONTIS ROBUSTA Horn.

Pl. 16, fig. 27.

Specimen No. 10015, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

One elytron half buried in a hard lump of asphalt, but the characters of the above species seem unmistakable. The species of this genus are rather numerous in some parts of Southern California. They hide under boards and in the midst of rubbish and only come out to forage during the twilight and even into the night, so from this it can be readily seen how they came to be entrapped in the tar springs.

## CONIONTIS ABDOMINALIS LeConte.

Specimen No. 10016, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

Two fairly well preserved specimens—with the head. The sculpture and striation are practically the same as in the living forms.

## CONIONTIS PUNCTICOLLIS LeConte.

Specimen No. 10017, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

A portion of an elytron in fairly good preservation, showing the smooth, shining, lightly punctured and striated surface.

CONIONTIS ELLIPTICA Casey.

Specimen No. 10018, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

The thorax and elytra of this species are present in recognizable condition. *Elliptica* and *robusta* are very closely related and some put them together. I was advised to do this, but on comparing the two I find sufficient difference to separate them. This form is more elongate; flatter; and the punctuation and striation not so evident.

ELEODES ACUTICAUDA LeConte.

Pl. 15, fig. 7; Pl. 16, figs. 16, 18, and 21.

Specimens No. 10019, *a, b, c, d*, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

These all belong to the typical form of this species. There is some variation, but there is a greater variation in the living forms. The species of this genus like that of *Coniontis* hide in dark places, under boards, in rubbish and even in squirrel holes during the daytime, and come out to forage in the evening after sunset. So their presence in the tar springs can be easily accounted for on the assumption that they made a misstep.

ELEODES ACUTICAUDA LeConte.

FORMA PUNCTATA.

Pl. 15, fig. 2; Pl. 16, fig. 15.

Specimen No. 10020, *a, b*, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

This very punctate form is easily recognized and the specimens are in a fair state of preservation.

ELEODES BEHRII, n. sp.

Pl. 15, figs. 3 and 4.

Type specimen No. 10023, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

A perfect specimen—with the exception of the missing head. Narrowly oval, slightly flattened dorsally, tapering and depressed

caudal, quadrate. The surface somewhat shining; punctation exceedingly evident, the punctures deep and broad; elytra smooth and glabrous. The margins of the elytra slightly rimmed. The epipleurum very wide cephalad and tapering, gradually, caudad.

This interesting and distinct species is related to *E. caudata*, and *E. parvicollis*, but is separated from both by the very punctate elytra like *E. caudata*; smooth and glabrous; and especially by the very wide epipleuræ, which are extraordinary, and nothing approaching it in this respect. It was very puzzling and the inclination was to put it in a different family, but it is placed here provisionally at least.

Length of specimen .....	10 mm.
Width .....	4.5
Greatest width of epipleurum .....	2.5

Dedicated to the memory of the best of my teachers, Hans Hermann Behr.

#### ELEODES CONSOBRINA LeConte.

Pl. 16, fig. 20.

Specimen No. 10021, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

The abdomen and elytra are well preserved, and characteristic of this species. The punctation and striation are very distinct.

#### ELEODES LATICOLLIS LeConte.

FORMA MURICATA MINOR.

Pl. 15, fig. 8; Pl. 16, figs. 19, 23, and 25.

Specimen No. 10022, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

The specimens are well preserved and characteristic, but all belong to the small, muricate form. There is considerable variation in the specimens, but there is as much in the living forms; and although some are strikingly different from living forms, it would hardly be of value to give names to such a variable group. There is a specimen 13 mm. long and another 19 mm. long.

*ELEODES INTERMEDIA*, n. sp.

Pl. 16, fig. 29.

Type specimen No. 10024, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

A complete abdomen and elytra are present, but more or less flattened. Broadly oval, flattened; quadrate cephalad, and sides parallel until near the caudal end when the elytra turn downwards and end in a comparatively sharp and inwardly curved point. Surface of elytra rather densely punctate, but not so punctate as in *E. behrii*. Striæ indistinct. The epipleurum, cephalad, measures 1.5 mm. in width, tapering gradually to the tip of the elytra. Epipleurum smooth, shining, not so punctate as the elytra.

This species is related to *E. parvicollis*, *E. caudata*, and *E. behrii*, but is distinguished by the very wide epipleurum, and the very punctate elytra, dorsally.

Length .....	12 mm.
Width .....	8.5

*ELEODES ELONGATA*, n. sp.

Pl. 16, fig. 30.

Type specimen No. 10025, Univ. Calif. Col. Invert. Palae. Asphalt beds at Rosemary, near Los Angeles.

Form very elongate; quadrate, convex, very much rounded; apex abruptly tapering, downwards, to an acute point. Surface smooth, glabrous, shining. The edges of the elytron, slightly keeled, projecting dorsad. There are a very few scattering, coarse punctures on the elytron.

There is a single, fairly well preserved elytron in a piece of asphalt which seems to differ from others by its more elongate form; glabrous and shining surface and sparsely punctured; the keeled and strikingly projecting edge of the elytron and the abruptly tapering apex. Dorsad the elytron is very obtuse, only very slightly tapered.

Length .....	21.5 mm.
Width .....	9

*Transmitted April 22, 1907.*

*Issued May 9, 1908.*

EXPLANATION OF PLATE 15.

Figs. 1, 5, 10, 12. *Julus cavicola*, n. sp. Type from Potter Creek Cave.

Fig. 2. *Eleodes acuticauda* (*forma punctata*) LeConte. From Rosemary, near Los Angeles.

Figs. 3 and 4. *Eleodes behrii*, n. sp. Type specimen from Rosemary, near Los Angeles.

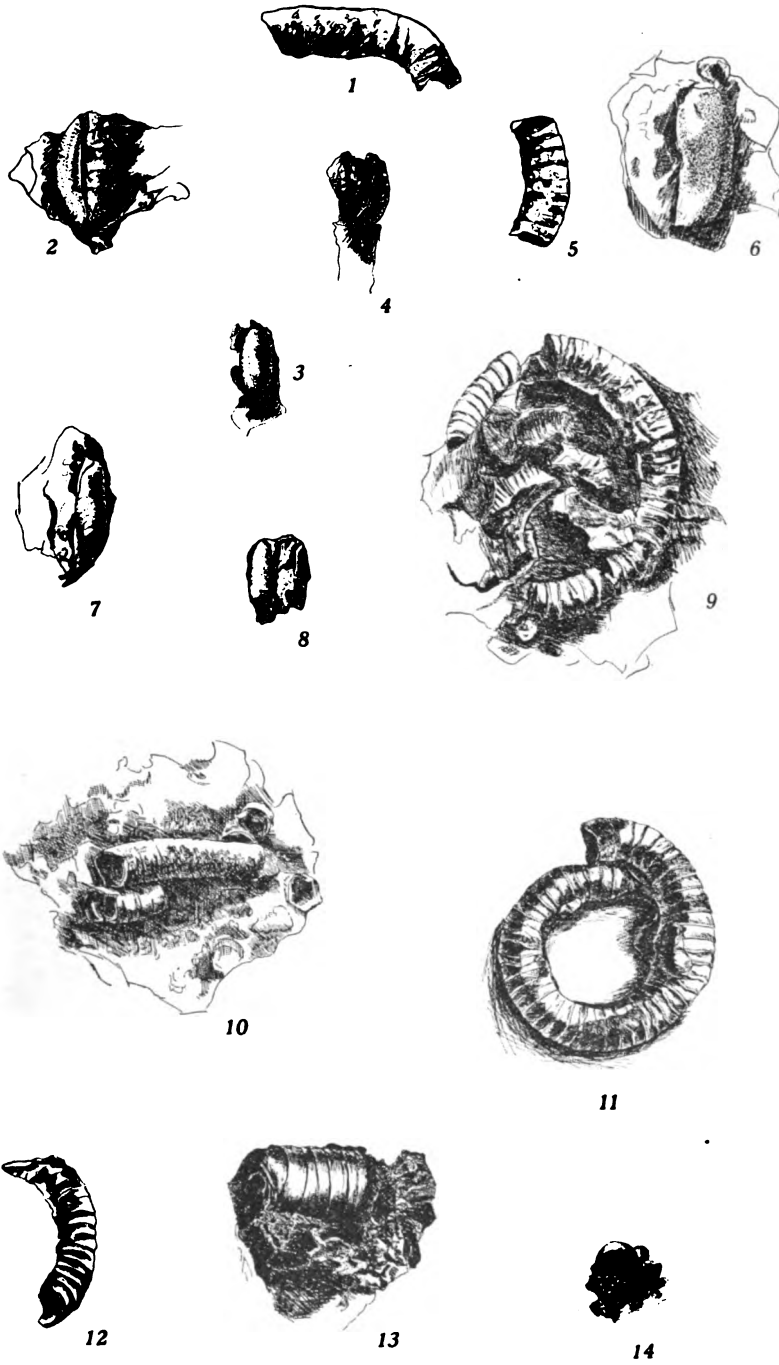
Fig. 6. *Dytiscus marginicollis* LeConte. From Rosemary, near Los Angeles.

Fig. 7. *Eleodes acuticauda* (*forma muricata minor*) LeConte. From Rosemary, near Los Angeles.

Fig. 8. *Eleodes laticollis* LeConte. From Rosemary, near Los Angeles.

Figs. 9 and 11. *Julus occidentalis*, n. sp. Type specimen from Samwel Cave.

Figs. 13 and 14. *Spirobolus australis*, n. sp. Type specimen from Rosemary, near Los Angeles.









EXPLANATION OF PLATE 16.

Fig. 15. *Eleodes acuticauda* (*forma punctata*) LeConte. From Rosemary, near Los Angeles.

Figs. 16, 18, and 21. *Eleodes acuticauda* LeConte. From Rosemary, near Los Angeles.

Fig. 17. *Amara insignis* Dej. From Rosemary, near Los Angeles.

Figs. 19, 23, and 25. *Eleodes laticollis* (*forma muricata minor*) LeConte. From Rosemary, near Los Angeles.

Fig. 20. *Eleodes consobrina* LeConte. From Rosemary, near Los Angeles.

Fig. 24. *Coniontis elliptica* Casey. From Rosemary, near Los Angeles.

Fig. 26. *Calosoma semilaeve* LeConte. From Rosemary, near Los Angeles.

Fig. 27. *Coniontis robusta* Horn. From Rosemary, near Los Angeles.

Figs. 22 and 28. *Eleodes acuticauda* LeConte. From Rosemary, near Los Angeles.

Fig. 29. *Eleodes intermedia*, n. sp. From Rosemary, near Los Angeles.

Fig. 30. *Eleodes elongata*, n. sp. Type specimen from Rosemary, near Los Angeles.







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PAT. JAN. 21, 1908

  
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