

[24 Oct. 1962]

FOSSIL ARTHROPODS OF CALIFORNIA. 24. SOME UNUSUAL
FOSSIL ARTHROPODS FROM THE CALICO
MOUNTAINS NODULES.

W. DWIGHT PIERCE

Los Angeles County Museum
and

JOHN GIBRON, SR.

Campbell, California

The unusual silicified arthropods recovered from Miocene petroliferous nodules, described in this article, were collected by Gibrón at U. S. Geological Survey Site #19057, the original discovery site of Dr. Allen M. Bassett, reported on by Dr. Allison R. Palmer (1957). This site is located in S.W. ¼ Section 24, R.1.E., T.10.N., Calico Mountains, San Bernardino County, California, at 2420 feet altitude. We believe that this is the oldest fossil site yet reported on in this mountain range.

The specimens were all extracted from the nodules by use of hydrochloric acid by Gibrón and Mrs. Gibrón (Julia). Critical study has been made by Pierce, who also prepared the figures.

Class ARACHNIDA

Order ARANEI

Family Dictynidae

Genus *Argenna* Thorell***Argenna fossilis* PETRUNKEVITCH 1957**

FIGURES 1A AND 1B

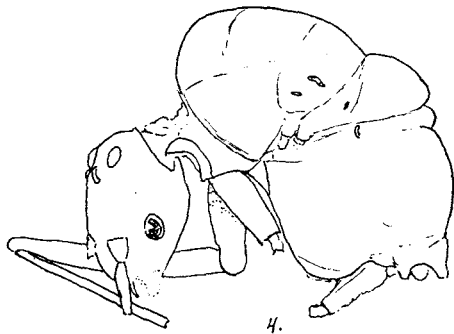
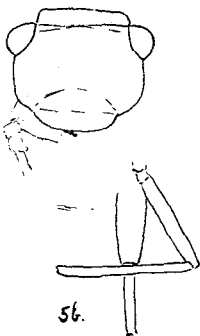
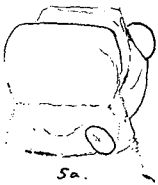
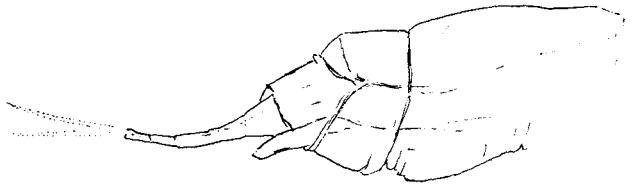
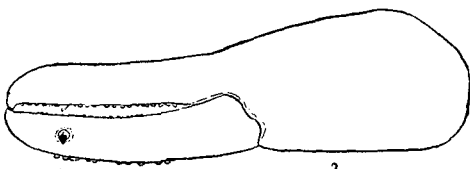
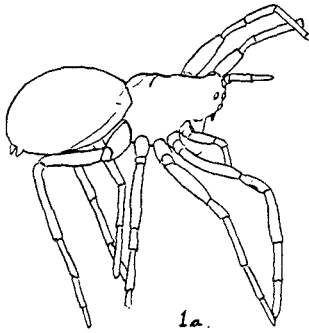
A beautiful, crystalline spider, specimen 5275, (Gibrón #H) was obtained from the type site of the Petrunkevitch species, and although larger than the type probably represents an older instar. It is mounted in balsam.

Total length 2.16 mm., cephalothorax 0.96 mm., abdomen 1.20 mm. The leg pattern (Table I) shows minor differences from those given in the original description. (See Palmer, 1957:246-248.)

TABLE I

Leg dimensions in millimeters of specimen No. 5275

Leg	Femur	Patella and		Tarsus	Total
		Tibia	Metatarsus		
I	0.68	0.68	0.40	0.36	2.12
II	0.60	0.64	0.40	0.32	1.96
III	0.60	0.64	0.48	0.36	2.08
IV	0.68	0.76	0.40	0.28	2.12



The specimen is crystal clear except as mentioned below.

The nervous system is pigmented with black masses almost filling the center of the cephalothorax, from which radiate nerves reaching the whole length of the appendages, and a large mass in the abdomen.

The cribellum is transverse, and the four spinnerets seem to be in a row, the outer ones larger with anal lobe below (Fig. 1b).

Order CHELONETHIDA Thorell

Suborder HETEROSPHYRONIDA J. C. Chamberlin 1929

Family Chthoniidae Hansen 1894

A silicified pseudoscorpion cheliceral claw was extracted from a nodule from the same site (19057) noted above.

In view of the absence of any indication of poison apparatus in either finger, and because the chela has no pedicel, but rather a socket for attachment, it is assigned as follows:

Subfamily Chthoniinae Daday 1887

Tribe Lechytini J. C. Chamberlin 1929

Genus *Lechytia* Balzan 1891

FIGURES 2A AND 2B

Chamberlin (1929), in his monograph of this suborder, figured the right chela of *Lechytia pacifica* (Banks) (*Roncus*), which most closely resembles this specimen in proportions and general shape, although differing in minor details. Banks (1893) very briefly described the hand of his species from Washington state, and Chamberlin records it also from California.

Length of chela 2.32 mm.; width 0.72 mm.; movable finger length 1.20 mm.; width 0.24 mm.

No setae are visible. The inner margin of each finger is armed with small quadrate teeth, and similar teeth occur on the outer margin of the movable finger, in the position often occupied by spinnerets.

A peculiar organ (Fig. 2c), looking like a tree growing out of a

Facing page:

Figure 1a. Side view of *Argenna fossilis*; size 2.16 mm. Figure 1b. Enlarged side view of end of abdomen of *A. fossilis*, showing spinnerets. Figure 2a. Cheliceral claw of pseudoscorpion, outer side; length 2.32 mm. Figure 2b. Inner side of base of cheliceral claw of pseudoscorpion, showing articulation. Figure 2c. Enlargement of unusual organ on finger of claw of pseudoscorpion. Figure 3. Posterior portion of an *Entomobrya*; length of specimen 1.6 mm. Figure 4. *Palaeosminthurus juliae*, new species of symphypleonid; length 2.4 mm. Figure 5a. Dorsal view of anterior portion of Troggiid corrodentian; length of specimen 1.6 mm. Figure 5b. Face and leg fragments of Troggiid corrodentian.

circular depression, occurs near the distal fourth of the movable finger.

The attachment of the chela is in a socket on the upper inner side, a little beyond the base. This claw differs from *L. pacifica*, in which the attachment is basal.

This seems to be the first fossil evidence of the pseudoscorpions in America, although there are European records.

Class INSECTA

Order COLLEMBOLA Lubbock 1873

Suborder ARTHROPLEONA Börner 1901

Family Entomobryidae (Tömösvary 1883) Gisin 1944

Genus *Entomobrya* Rondani 1861

Pierce (1960) described a fossil Collembolan, *Entomobrya* (*Entomobrya*) *kirkbyae* from the other side of the Calico Mountains in N.W. ¼ Section 19, R.2.E., T.10.N., a little over one mile away but in a much later geological horizon of the Miocene. It measured only 1.50 mm., for complete insect with extended springer.

A second record (Fig. 3) is now added, of a posterior portion of an *Entomobrya* without the complete springer. The preserved portion measures 1.6 mm., and therefore the entire insect would be considerably larger than *E. kirkbyae*, but still could be a later instar of that species.

Suborder SYMPHYPLEONA Börner 1901

The unusual specimen now to be described is in some respects intermediate between the two suborders, and in absence of a collophore would seem to stand by itself. The condensed form of the body otherwise places it in this suborder but a number of characters require separation to form a new family.

Family Palaeosminthuridae, New Family

Head with pigmented eyes beyond middle and lateral to insertion of antennae, and with four clear lensed ocelli on vertex. Prothorax reduced, but bearing the only functional legs. Mesothorax greatly enlarged; metathorax dorsally distinct. Middle and hind legs greatly reduced. First abdominal indicated but without collophore. Anal papilla and furcula distinct.

Genus Palaeosminthurus, New Genus

Fore legs elongate; middle and hind legs rudimentary; collophore lacking; small oval spiracles on mesothorax; metathorax and first abdominal.

Palaeosminthurus juliae, NEW SPECIES

FIGURE 4

Named in honor of Julia, Mrs. John Gibron, Sr., in recognition of her constant collaboration with her husband in the work of collection and separation of the fossils.

Although this interesting insect is crystallized and semi-transparent, the white surface pigmentation remains.

Length, 2.4 mm.; height, 2 mm.

Head on flexible neck, directed downward, hypognathous. Antennae located in front of the middle. Only two joints of one antenna remain. Pigmented eyes outlined by a clear oval line occur lateral to the bases of the antennae. On the vertex are two large oval, and two smaller crescent shaped ocelli with clear convex lenses. These are placed in the area where the so-called eye patches of separate ocelli occur in other Collembola. An ensiform mandible is indistinctly visible, slender, acute. Other mouth parts are indistinct in a foamy mass of crystal.

The prothorax is membranous, small, with a curved cervical plate from base of head to anterior corner of coxae. The front legs are long (one is complete except for claws), with coxa, trochanter, femur and tibiotarsus in the proportions 30:20:50:60.

Mesothorax massive, humped high above prothorax, strongly convex, definitely defined by deep suture behind, but ventrally meets the prothorax and abdomen in a point. Faintly the prescutum, scutum and scutellum are defined, and on scutellum at the side is an elongate oval opening which seems to be a spiracle, and on one side there is a sinuous scar above this. The rudimentary second legs are indicated by two segments, upon the side of the body below the first spiracle.

Metathorax dorsally consists of scutellum, but laterally this is preceded by a narrow scutum, which bears a transverse opening or spiracle, and below this are the rudiments of the third leg.

First segment of abdomen is dorsally distinctly outlined, bears an opening or spiracle opposite that of metathorax, and the lateral boundary is faintly outlined. There is no trace of a collophore, nor is there any space for such an organ, as the mesothorax, metathorax, and first abdominal come to a single ventral point adjoining the prothorax.

The second, third and fourth abdominal segments are one large undifferentiated mass, except that from the venter of the fourth springs the manubrium of the springer.

This organ is soft, two-segmented, and lacks the dens and mucro in the present specimen.

The anal papilla, or fifth and sixth segments from side view, has a dorsal and ventral process, with a central lobe (sixth).

The presence of eyes and ocelli, absence of colophore, reduction of middle and hind legs, and great development of meso- and metathorax, set this insect off as very distinct from any insect described in either suborder of springtails.

Superorder CORRODENTIA Burmeister 1839

Order COPEOGNATHA Enderlein 1903

Suborder TROGIOMORPHA

Family Trogiidae

FIGURES 5A AND 5B

A fragment of a crystallized procid is represented by Specimen 5282, collected and extracted by Gibron.

This is the second record for this order, from the Miocene of the Calico Mountains (for the first, see Pierce, 1960:45-46.).

Length of specimen 1.6 mm.; width of head 0.72 mm.

The head is turned down beneath the thorax, but the broad face is complete with bulging eyes, broad clypeus and labrium. The thorax is definitely three segmented, mesothorax largest. An oval disc on metathorax may be a wing pad.

Order EPHEMERIDA Leach 1817

Family Baetidae Ulmer 1920

FIGURES 6, 7, AND 8

In article No. 23 of the Series W.D.P. recorded a fossil mayfly and her egg mass found in Section 19, R.2.E., T.10.N., Calico Mountains.

We are now able to report on three crystallized mayfly adults, Specimens 5096, 5286, 5307; all found by Gibron at U.S.G.S. site No. 19057, noted above.

Fossil mayflies date back to the Permian Period, but the record is based almost entirely on winged adults crushed and lying in shales. In these new specimens we have two crystallized adults, and one subimago, with only fragments of the wings, and it is hardly yet advisable to name them. The small size seems to limit them to the family Baetidae. Only the genera *Caenis*, *Baetis*, *Pseudocloeon* and *Cloeon* are recorded as holding species with adult size under 3 mm.

Organisms of decay are in all three specimens, indicating death before preservation. This is natural as the usual life of a mayfly is but a day.

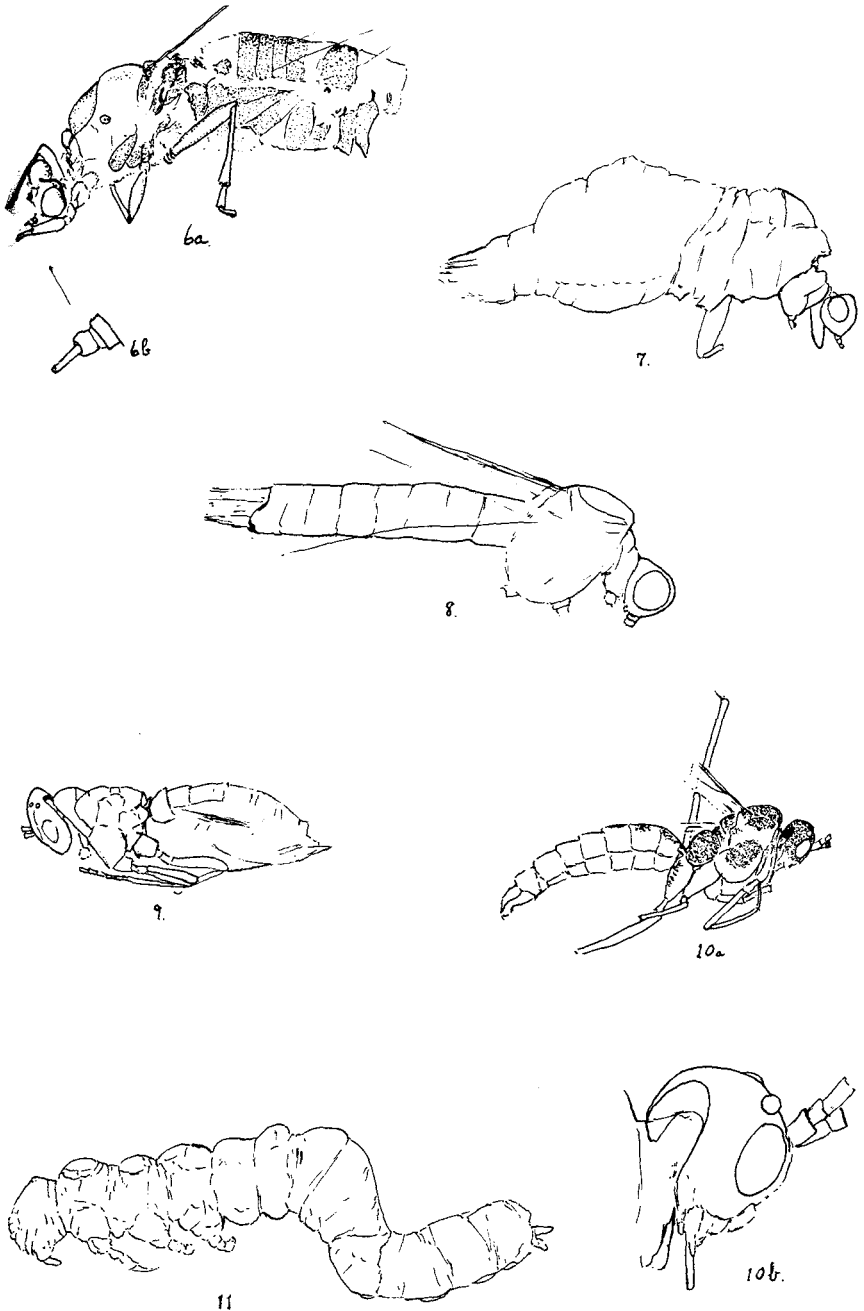


Figure 6. Adult mayfly, No. 5286; length 1.96 mm. Figure 7. Subimago mayfly, No. 5096; length 1.92 mm. Figure 8. Adult mayfly, No. 5307; length 3.04 mm. Figure 9. Adult chalcid wasp; length 1.88 mm. Figure 10a. Adult ichneumonid wasp; length 6.0 mm. Figure 10b. Side view of head of ichneumonid wasp. Figure 11. Lepidopterous larva; length 1.03 mm.

Specimen 5096 (Fig. 7) is a subimago, measuring 1.92 mm. Crystallization is not clear cut. There are round bodies in the intestinal tract.

Specimen 5286 (Fig. 6a and 6b), is a mature insect, measuring 1.96 mm. in length without its cauda; with three legs and antenna visible. There is considerable brown pigmentation of the thoracic and abdominal sclerites. Viewed from an unnatural angle, the posterior margin of the head appears to be arched posteriorly, neither straight nor emarginate, and this would seem to remove it from any of the genera mentioned above. The antennae (Fig. 6b), have a short, transverse first joint, a longer but transverse second joint, and an elongate third joint. The legs are short.

Specimen 5307 (Fig. 8) is a larger insect, measuring 3.04 mm., with only the bases of the caudal filaments present; and only the coxal bases of the legs. In side view it has a typical mayfly appearance with large meso-metathorax; small prothorax. Crystallization is not clear cut due to decay materials which obscure many outlines.

Order HYMENOPTERA
Superfamily Chalcidoidea Ashmead

FIGURE 9

A minute crystallized Chalcid adult, Specimen 5289 (Gibron H35) was recovered by Gibron, from a nodule from Site 19057, U. S. G. S.

Length 1.88 mm., specimen pigmented dorsally. Fragments of wings, mouth parts, and legs are undecipherable.

Superfamily Ichneumonoidea

FIGURES 10A AND 10B

An excellent specimen of ichneumonid wasp, Specimen 5087 was recovered from a nodule found at Site 19057, U. S. G. S.

Length 6.0 mm. Crystallized, but with reddish brown pigmentation on head, thorax and three abdominal segments. The head (Fig. 10b) has three round ocelli, but mouth parts are not distinct, and only the bases of antennae are present. The legs are long and slender.

Order LEPIDOPTERA

FIGURE 11

A crystallized first instar larva, Specimen 5079 (Gibron #6) is an interesting addition to the series collected at Site 19057, U. S. G. S.

Size 1.03 mm. This larva has three pairs of legs, and also evidences of four pairs of prolegs, and two caudal cerci. It is presented to represent the order until certain moths found by Mrs. Kirkby can be studied.

LITERATURE CITED

BANKS, NATHAN

1893. New Chernetidae from the United States. *Can. Ent.*, 25:64-67.

CHAMBERLIN, J. C.

1929. Synoptic classification of false scorpions. *Ann. Mag. Nat. Hist.*, ser. 10, 4:50-80.

PALMER, ALLISON R.

1957. Miocene arthropods from the Mojave Desert, California. *U.S. Geol. Surv. Professional Paper* 294-G; pp. 237-280, figs. 89-101, plates 30-34.

PIERCE, W. DWIGHT

1960. Fossil arthropods of California. No. 23. Silicified insects in Miocene nodules from the Calico Mountains. *Bull. So. Calif. Acad. Sci.*, 59 (1):40-49, plates 14-17.