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FOSSIL ARTHROPODS FROM ONYX MARBLE

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1. INTRODUCTORY NOTE.

In the search for fossil insects we have perhaps been overlooking what may be a fertile field—the hot springs of our western country.

References in paleontological literature are very scarce. In 1928 Otto Schmidtgen (Verhandl. Zool-Bot. Ges. Wien 78(1): (35)-(39) reported on the trails of 20 kinds of insects from what was probably the border of a pool in Permian deposits at Nierstein on the Rhine.

In 1929 Friedrich Zeuner (Palæontol. Zeitsch. 11(4) :330-339, 1.pl.) described a rich Miocene thermal spring lime deposit containing many kinds of insects. He concluded that the animals overcome by the fumes, dropped into the spring, became asphyxiated, and were encased with lime within a few hours, before organic decay set in. Thus a perfect preservation of form occurred, second only to amber inclusion.

In the Desert Magazine of August 1946, John Hilton, artist and desert naturalist, wrote an article "Fossils while you wait," describing a high pressure flow of hot water highly charged with aragonite, forming onyx of various colors.

This water is so mineralized that insects, plants and animals falling in it are quickly covered with fine crystals and preserved. This well is near the Canal Road between the Chocolate Mountains and the Salton Sea, 29.3 miles from Mecca, California, in the Imperial Valley.

There are many onyx forming hot springs, especially in the neighborhood of the San Andreas Fault, and these must be studied to learn the steps in fossilization, and to find true fossil material.

Dr. Alexander Petrunkevitch (Amer. Jour. Science 243 (June): 320-329, 1 pl., 8 figs. 1945) published the first records of arthropods in American calcite deposits, based on onyx marble from Bonner Quarry of the Southwest Onyx and Marble Company, located in a canyon the north side of Black Mesa about ten miles southwest of Ashfork, Arizona. He included a description of the geologic formation by Prof. Edwin D. McKee, Assistant Director of the Museum of Northern Arizona, at Flagstaff, Ariz.

According to Prof. McKee the onyx is "post faulting," or was formed since the middle of Cenozoic time, that is Upper Miocene

or Pliocene, but is deposited in cracks and faults in Permian Supai formation.

Evidently the Arthropods were washed into or drowned in calcite saturated waters and thus preserved.

Dr. Petrunkevitch erected a family Calcitronidae in the Order Schizomida, which was formerly known as the family Schizonotide in the Suborder Uropygi of Order Pedipalpi. The type genus of the order is *Schizomus* Cook 1899 (*Schizonotus* Thorell 1888 preoccupied).

The first fossil species in this new order he described as *Calcitro fisheri*. Two specimens were seen and described with drawings and photographs.

Recently Mr. Fritz W. Schmidt of Long Beach handed the writer a third onyx pen base in which were visible at different levels six specimens, five of them belonging in the pedipalpid arachnids, and one a primitive japygid. This last is the first record of a fossil japygid, and the first record of any insect fossil in onyx.

2. NEW PEDIPALPIDS FROM ONYX MARBLE.

The onyx pen base now at hand has at the surface a very distinct pedipalpid, and deeper in the onyx are four smaller specimens probably younger forms, though possibly an entirely different species.

Petrunkevitch separated his *Calcitro* from Schizomidae on the number of tarsal joints, the Schizomid genera *Schizomus*, *Trithyreus*, and *Stenochrus* having three tarsal joints on each of the second, third and fourth pairs of legs; while *Calcitro* has five tarsal joints on the second pair, and four each on the third and fourth pairs. The present specimen has, as nearly as I can make out, but two tarsal joints and metatarsus on the second, third, and fourth pairs. On many other characters it differs generically from *Calcitro*.

Since the dorsal plate is not discernible it is impossible to determine whether this has the character of Thelyphonidae or Scizomidae, but it seems better to temporarily align it with the Thelyphonidae.

Genus ONYCHOTHELYPHONUS, new genus.

Type *O. bonneri* new species.

A thelyphonid having two last abdominal segments cylindrical, and the preceding segment much smaller and narrower than the other segments; caudal appendage with seven segments. All legs long and slender in the order 4, 1, 3, 2. Tarsal joints three in

first pair, and two each on the other pairs. Coxae continguous on median line in second and third pairs, but separated by abdominal process in fourth pair.

ONYCHOTHELYPHONUS BONNERI, new species (Figure 1 of Plate 34.)

Type in Los Angeles County Museum Fossil Insect Collection, No. BQ1.

The specimen is on its back, just below the surface of the plaque, and is complete except for the hand of the left pedipalp, the entire right pedipalp, and the chelicera. The last three joints of the second right leg are broken off, but lie just beyond.

This thelyphonid differs from *Calcitro fisheri* in having stout, short jointed pedipalpi, with a short inner apical tooth on tibia; very small pedipalpal sternal plates; a longitudinally divided sternum between front legs; absence of anterior apical tooth on second coxae; first legs with three long tarsal joints; other legs with two long tarsal joints; ninth abdominal short, much narrower than eighth, but wider than the cylindrical tenth and eleventh segments; tail seven jointed.

Its measurements are: total length from anterior end of pedipalpal coxae to tip of tail 3.64 mm.; length of tail 0.44 mm.; base of abdomen to base of tail 2.12 mm.; greatest width of abdomen 0.84.; width of last two segments 0.32 and 0.28 mm. The order

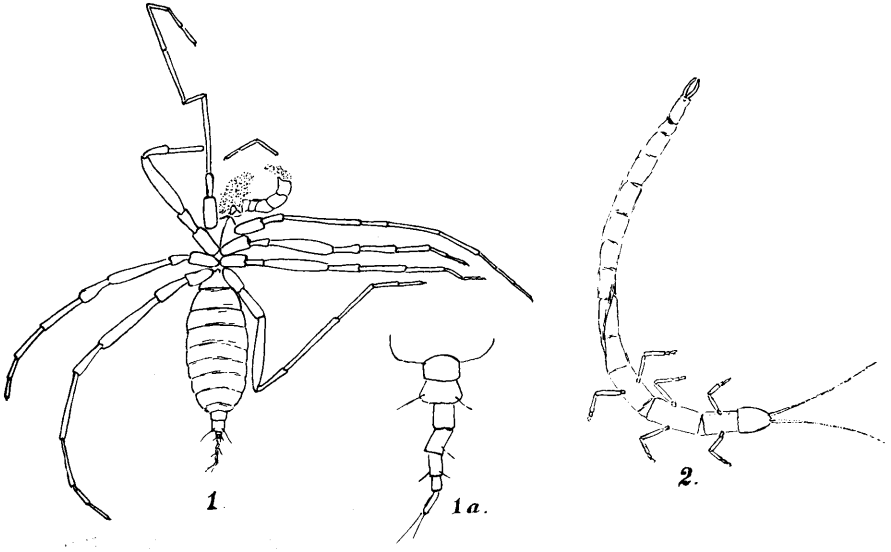

PLATE 34

of the legs is 4, 1, 3, 2. The surface of the ventral segments and femora is closely deeply transversely pitted.

LEG MEASUREMENTS IN MM.

Appendage	Coxa	Trochanter	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Pedipalpi	0.08	0.04	0.20	0.24	0.20	missing	missing	
Leg I	0.40	0.28	1.04	0.38	0.74	0.60	0.92	4.36
Leg II	0.44	0.28	0.88	0.36	0.48	0.44	0.52	3.40
Leg III	0.36	0.24	0.88	0.40	0.64	0.52	0.56	3.60
Leg IV	0.36	0.44	1.00	0.48	0.96	0.64	0.68	4.56

The other four specimens are deeper in the onyx and more decomposed, as well as much smaller. Whether they are younger specimens of the same creature or another species has not yet been determined.

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3. A PRIMITIVE THYSANURAN FROM ONYX MARBLE.

Just 65 mm. from the *Onychothelyphonus* there is an insect specimen belonging to the Order Dicellura, Family Japygidae; probably the oldest fossil yet found in this order. The body is greatly distended and largely reduced to a skin.

Genus ONYCHOJAPYX, new genus.

A japygid with simple unjointed, untoother caudal cerci, two jointed tarsi.

ONYCHOJAPYX SCHMIDTI, new species (Figure 2 of Plate 34).

Named in honor of Fritz W. Schmidt, through whose kindness the material came to hand.

Type in Los Angeles County Museum Fossil Insect Collection, No. BQ 2.

The abdomen is twisted over, but the anterior portion is the ventral aspect.

Length of specimen as curved 4.80 mm., straightened 6.32 mm. Length of head 0.40 mm.; antennae 1.60 mm.; prothorax 0.48 mm.; mesothorax 0.72 mm.; metathorax 0.64 mm.; abdomen including cerci 4.08 mm.; cerci 0.32 mm.

The legs are simple and of the following pattern:

	I.	II.	III.
Coxa	0.08mm.	0.08mm.	0.08mm.
Femur	0.24	0.32	0.32
Tibia	0.16	0.24	0.24
Tarsus	0.16	0.16	0.16

The slender antennae are many jointed.

This insect is especially interesting because so few thysanuran insects have ever been found fossil, and because of their fragile nature are hardly to be expected.