

SCIENTIFIC NAME: *Banksula* species, including:
B. californica
B. galilei
B. grubbsi
B. martinorum
B. rudolphi
B. tuolumne
B. tutankhamen

COMMON NAME: None; cave harvestmen

CLASS, FAMILY: Arachnida, Phalangodidae

ORIGINAL DESCRIPTIONS:

- Banks, N. 1900. New genera and species of American Phalangida. Journal of the New York Entomological Society 8:200 (*Scotolemon californica*).
- Briggs, T.S. 1974. Phalangodidae from caves in the Sierra Nevada (California) with a redescription of the type genus (Opiliones: Phalangodidae). Occasional Papers of the California Academy of Sciences 108:5 (*tuolumne*), 6 (*galilei*), figs. 12-17 (*tuolumne* - dorsal view of male, claws of hind tarsus, ventral and lateral views of penis, and lateral view of male), 18-22 (*galilei* - ventral view of penis, claws of hind tarsus, dorsal view of male, ovipositor, lateral view of male).
- Briggs, T.S. and D. Ubick. 1981. Studies on cave harvestmen of the Central Sierra Nevada with descriptions of new species of *Banksula*. Proceedings of the California Academy of Sciences 42(11):316 (*rudolphi*), 318 (*martinorum*), and 319 (*grubbsi*), figs. 1 (distribution map), and 2-4 (lateral view of body and left palpus of *rudolphi*, *martinorum*, and *grubbsi*).
- Ubick, D. and T.S. Briggs. 2002. The harvestman family Phalangodidae 4. A review of the genus *Banksula* (Opiliones, Laniatores). The Journal of Arachnology 30:441 (*tutankhamen*), figs. 9 (distribution map), 33-40 (eyemound of male, dorsal view of body, lateral view of left palp, ventrobasal view of left palpal femur, lateral and dorsal views of penis, close-up of glans, dorsal view of ventral plate prongs).

TYPE MATERIAL:

- Banksula californica*: lectotype male and paralectotype female – California: El Dorado County; Alabaster Cave, Marx, collector. Deposited at the Museum of Comparative Zoology, Harvard.
- Banksula galilei*: holotype male – California: Placer County; Lime Rock Caves, near Auburn, under breakdown in pit room, 21 Dec 1966, V.F. Lee and T. Briggs, collectors. Allotype female – same data as holotype except 2 Jun 1966, A. Jung, K. Hom, T. Briggs, collectors. Also 5 paratypes, same locality, various dates and collectors. Holotype deposited in the California Academy of Sciences, type #11966.
- Banksula grubbsi*: holotype male – California: Amador County; Black Chasm Cave, near Volcano, 19 Feb 1978, A.G. Grubbs; deposited in the California Academy of Sciences, type #14018.
- Banksula martinorum*: holotype male, allotype female, and 1 female and 2 juvenile paratypes – California: Calaveras County; Heater Cave, 8 km north of Columbia, 15 Mar 1979, D.C. Rudolph, B. Martin, and S. Winterath, collectors. Deposited in the California Academy of Sciences; holotype is type # 14019.

Banksula rudolphi: holotype male, allotype female, and 9 male, 9 female, and 3 juvenile paratypes – California: Amador County; Chrome Cave, near Jackson, 5 Apr 1979, D.C. Rudolph, S. Winterath, and B. Martin, collectors. 2 male, 2 female, and 3 juvenile paratypes, same locality, 21 Sep 1980, T.S. Briggs and D. Ubick, collectors. 1 male paratype, same locality, 24 Jan 1981, T.S. Briggs and D. Ubick, collectors. Deposited in the California Academy of Sciences; holotype is type # 14020.

Banksula tuolumne: holotype male and allotype female – California: Tuolumne County; Tuolumne Crystal Cave, near Tuolumne, under wood, 22 Feb 1969, T. Briggs. Nine paratypes, same data as holotype and allotype. Deposited in the California Academy of Sciences; holotype is type #11969.

Banksula tutankhamen: holotype male – California: Calaveras County; King Tut Cave, near Cave City and O'Neil Creek, 24 Aug 1991, T. Briggs, D. Cowan, G. Malliet, W. Rauscher, D. Ubick, collectors; deposited in California Academy of Sciences, type #17952.

RANKING/STATUS: G1S1 (NatureServe – CNDDDB), except *Banksula californica*, which may be extinct and is ranked GSHS (NatureServe – CNDDDB).

GENERAL DESCRIPTION: Minute troglobitic harvestmen. All species are less than 2 mm in length and are various shades of yellow to yellow-orange.

DIAGNOSTIC CHARACTERS: Ubick and Briggs (2002) state that *Banksula* are "unique among the Nearctic phalangodids in having a row of setiferous dorsal tubercles on the palpi femur, and a penis with a bifurcate ventral plate with ventrally positioned prongs." Basic diagnostic characters for the species are as follows:

B. californica: palpal femur with 3 ventrobasal and 1 mesoapical megaspines; males with enlarged femora and reduced ectal megaspines on the tibia and patella; with a low, rounded eyemound lacking retinae.

B. galilei: palpal femur and male femora as in *B. californica*, but eyemound oblique and truncate, retinae dark; apical spine of ventral plate prong short.

B. grubbsi: as for *rudolphi*, except proximal ventral spinose tubercle on palpal tibia always smaller than ventral spinose tubercle on patella; eye tubercle obliquely truncate in lateral view, retinae absent, corneas present; no spur ectal to proximal ventral spine on palpal femur.

B. martinorum: as for *B. rudolphi*, except no submarginal rows of tubercles on tergites or sternites; eye tubercle subconical without retinas or corneas.

B. rudolphi: Operculum small, held almost entirely between mesal margins of fourth coxae; males with apex of aedeagus not enclosed in sheath, velum on dorsal plate smooth; no small spines or tubercles between principal dorsal spines on palpal femur; proximal ventral spinose tubercle on palpal tibia equal to ventral spinose tubercle on patella; eye tubercle a rounded cone without retinae, corneas present or absent; submarginal row of tubercles on eighth tergite and last sternite.

B. tuolumne: as in *B. californica*, but with a rounded double ectal tubercle at the base of the proximal megaspine on the palpal femur in males; reduced proximal ectal megaspine on the palpal tibia in females.

B. tutankhamen: "...differs from all other *Banksula* by its longer legs (having the highest Leg II/Scute length ratio in the genus) and in the tuberculation at the basal megaspine

of the palpal femora, where the male has an enlarged or double mesal tubercle and both sexes lack an ectal one." (Ubick and Briggs, 2002).

OTHER ILLUSTRATIONS: Ubick and Briggs (2002) provide scanning electron micrographs of:

- B. galilei* (figs. 7, venter of female; 23-27, eyemound of female, dorsolateral view of penis, ventral plate prong, lateral view of ovipositor, close-up of lateral surface of ovipositor).
- B. martinorum* (figs. 41-45, eyemound of female, dorsal view of penis, ventral view of penis, ectal views of left male palp and left female palp).
- B. rudolphi* (figs. 28-32, eyemound of male, dorsolateral view of penis, ventral plate, ventrobasal portion of male palpal femur, ventrobasal portion of female palpal femur).
- B. tuolumne* (figs. 46-49, male eyemound, ventrobasal portion of palpal femur, ventral view of penis, dorsolateral view of penis).
- B. tutankhamen* (figs. 33-36, male eyemound, dorsal view of body, lateral view of left palp, ventrobasal view of left palpal femur; 37-40, male penis, lateral and dorsal views, close-up of glans, dorsal view of ventral plate prongs).

Fig. 9 presents a distribution map of the above species plus *B. californica* and *B. grubbsi*, as well as *B. melones* and *B. incredula*, treated in separate accounts.

DISTRIBUTION: Central Sierra Nevada.

HABITAT: Restricted to caves. *Banksula rudolphi* occurs in Chrome Cave, a small cave in a limestone outcrop surrounded by serpentine, which forms most of the cave's walls. The interior of the cave has high relative humidity and the mean temperature during a visit in January 1981 was 18°C. Individuals of this species were usually found on the undersides of rocks in the upper regions of the cave.

Alabaster Cave, the type locality of *Banksula californica*, has been partially destroyed by mining and the species may be extinct; the cave has been sealed by concrete so it is impossible to survey for the species.

LIFE HISTORY/BEHAVIOR: There is no published information on the life history or behavior of these species.

SELECTED REFERENCES:

Ubick, D. and T.S. Briggs. 2002. The harvestman family Phalangodidae 4. A review of the genus *Banksula* (Opiliones, Laniatores). The Journal of Arachnology 30:435-451.

Written by Sandra Shanks, California Department of Fish and Game, Natural Diversity Database

Reviewed by Darrell Ubick, Department of Entomology, California Academy of Sciences, San Francisco.