

NEW RECORDS OF MYXOMYCETES FROM CALIFORNIA. VI.

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ABSTRACT

Twenty-two additional species of Myxomycetes are reported from California. Nine of these, *Comatricha ellae*, *C. longipila*, *C. penicillata*, *Didymium bahiense*, *D. verucosporum*, *Licea lucens*, *Macbrideola argentea*, *Paradiacheopsis cribrata* and *P. microcarpa*, appear to be new records for the United States.

In the last paper of this series (Kowalski 1973), I reported that 231 species of slime molds had been reported from California. Since then, an additional 32 species have been listed from the state. These additional records resulted mainly from the work of Whitney (1980, 1982) on corticolous species and Cox (1981) on coprophilous taxa. In the present paper, 22 new records are discussed, bringing the number of species of Myxomycetes reported from California to 285.

All collections listed have been deposited in the Herbarium of the University of California (UC). The nomenclature generally follows that of Martin and Alexopoulos (1969) and, unless otherwise stated, the collection numbers are my own.

LICEACEAE

LICEA LUCENS Nannenga-Bremekamp.—Butte Co.: Chico, Upper Bidwell Park, on Live Oak bark, 24 Jan 1977, *Whitney* 368; Lower Bidwell Park, on bark of *Quercus lobata* Neé, 23 Feb 1977, *Whitney* 401. Both collections were obtained from bark placed in moist chambers to allow the fructifications to develop. The minute (ca. 50 μm in diameter) stalked, bright orange sporangia, containing strongly warted spores, are the hallmarks of this distinctive species. In her original description, Nannenga-Bremekamp (1981) states the spores are 8–10 μm in diameter; in the California collections, however, they are usually 10–11 μm in diameter.

Because of its small size, *L. lucens* appears most similar to *L. perexigua* Brooks & Keller. Both taxa have brightly shining, often stalked sporangia that are less than 100 μm in diameter. The major differences between the species are as follows: in *L. perexigua* the sporangia are yellow to dark bluish gray and the spores smooth, whereas in *L. lucens* the sporangia are orange and the spores are distinctly warted. *Licea lucens* was described originally from France,

and the present report marks only its second known occurrence. As more workers cultivate bark in damp chambers for slime molds, I predict this species will be found in many localities.

LICEA OPERCULATA (Wingate) Martin.—Alameda Co.: Oakland, Redwood Park, on bark, 4 Feb 1970, *Duran*; Berkeley, Strawberry Canyon, on bark, 29 Jan 1972, *Duran*. As with *Licea lucens*, both collections were obtained by the moist chamber technique. The stalked, urniform, operculate sporangia separate this taxon from all other members of the genus. Martin and Alexopoulos (1969) give the height of the fructifications as 0.4–1.0 mm and state that the spores are colorless by transmitted light. In the California material, the total height of the fruiting bodies reaches 1.2 mm and the spores are pale yellow by transmitted light. *Licea operculata* has been reported from numerous locations around the world and appears to be common on the bark of living trees.

RETICULARIACEAE

LYCOGALA EXIGUUM Morgan.—Butte Co.: Covered Bridge, Honeyrun Road, on decayed wood, 15 Apr 1967, 5974. This collection of the pseudocapillitium are approximately 5 μ m in diameter and the spores are small, averaging 4.5–5.0 μ m in diameter, and smooth to weakly reticulate. This taxon has been reported from many localities beyond California, but in all cases it appears to be uncommon.

ENTERIDIUM MINUTUM Sturgis.—Plumas Co.: Humbug Summit, 6700 ft., on decayed wood, 4 Jun 1966, 3320; Siskiyou Co.: Mt. Shasta, Panther Meadows Campground, 7600 ft., on decayed wood, 6 Jul 1965, 1821, 1878. Confusion as to the exact status of this species has existed in the past. Both Lister (1925) and Hagelstein (1944) reluctantly accepted the taxon as valid, whereas Martin and Alexopoulos (1969) thought it was a small form of *Enteridium olivaceum* Ehrenberg [*Reticularia olivacea* (Ehrenb.) Fries]. The problem originated because all workers stressed the size of the fructifications. Lister thought *E. minutum* had aethalia 1–2 mm in diameter, whereas those of *E. olivaceum* were usually over 1 cm. Martin and Alexopoulos, however, thought the size overlapped and, thus, did not believe that *E. minutum* was worthy of recognition. I agree with Martin and Alexopoulos that the size of the fructifications overlap. If one looks at the spores, however, the two taxa can be distinguished easily. In *E. olivaceum*, the spores are olivaceous, occur in large clusters, usually 6–20 in number, and the ornamentation consists of large warts covering about one-half of the surface of the spores. In *E. minutum*, the spores are yellow, the clusters are small, usually consisting of 2–4 spores, and the ornamentation is minutely spinulose or warted, covering most of the surface of the spores. *Enteri-*

dium minutum is an extremely rare species. Previously it had been known only from the type locality at Eldora Lake, Colorado, and from Yorkshire, England.

CRIBRARIACEAE

CRIBRARIA FERRUGINEA Meylan. — Mendocino Co.: Simpson Lane, 2 mi e. of State Hwy 1, on decayed wood, 15 Apr 1976, 13467. The large, brick-red sporangia, 1.0–1.5 mm in diameter, with their peridial nets lacking distinct nodes and calyculi, delimits this distinct, apparently rare species. Martin and Alexopoulos (1969) give its distribution as Switzerland, Tennessee, Oregon, and New Mexico.

TRICHIACEAE

ARCYRIA MAGNA Rex. — Butte Co.: Chico, Lower Bidwell Park, on decayed wood, 4 Feb 1967, 5225; Humboldt Co.: Humboldt Redwoods State Park, on decayed wood, 26 Jan 1966, 2412. The numerous, densely clustered, grayish sporangia, which often attain a length of more than a centimeter after becoming fully expanded, separate this species from other members of the genus. Although occurring worldwide, *A. magna* is found infrequently.

TRICHIA MACBRIDEI M. E. Peck. — Butte Co.: Philbrook Reservoir, 5500 ft., on dead bark, 13 Jul 1966, 3809. This taxon can be differentiated by the dark, sessile sporangia that contain brownish spores 11–13 μm in diameter. *Trichia brunnea* Cox is the only other species in the genus that has brown spores, but it has stipitate sporangia and the spores are 10–11 μm in diameter. An unusual feature of the California collection is the capillitial threads that often terminate in depressed expansions, which resemble minute suction cups, a characteristic that has not been reported previously. *Trichia macbridei* is rare and it apparently has been reported previously only from Oregon.

TRICHIA SUBFUSCA Rex. — Humboldt Co.: Patrick's Point State Park, on decayed wood, 29 Mar 1969, 9910, and on decayed bark, 1 Apr 1969, 9967; Mendocino Co.: MacKerricher Beach State Park, on decayed wood, 12 Apr 1968, 8258. *Trichia subfusca* often has been included in *Trichia botrytis* (G. F. Gmel.) Pers., which may explain why this relatively common species has not been reported from California. The best features to use in distinguishing the two taxa are the capillitium and spores. In *T. botrytis*, the individual elaters taper gradually to long, slender, pointed tips, and the spores are 9–11 μm in diameter. In *T. subfusca*, the elaters end abruptly, often in curved, pointed tips, and the spores are (11–)12–14(–15) μm in diameter. The hypothallus in *T. subfusca* is huge, often uniting the individual sporangia into a unit, whereas in *T. botrytis* it is usually much smaller and much less extensive, rarely uniting the sporangia.

STEMONITACEAE

AMAUROCHAETE COMATA G. Lister & Brândză. — Butte Co.: Chico, Lower Bidwell Park, on dead bark, 23 Nov 1966, 3956, and 12 Feb 1969, 9899; 14 mi n. of Chico, Pine Creek Ranch, 1 Feb 1973, 12587. *Amaurochaete comata* is the only species in the genus with a capillitium consisting of flaccid, circinate threads, approximately 1–2 μ m in diameter; therefore, it is distinct. The collections cited above differ somewhat from the description given in Martin and Alexopoulos (1969). They give the diameter of the aethalia as 5–10 mm and describe the spores as prominently warted. In the California material, the aethalia are up to 5 cm in diameter and the spores are distinctly spinose. These differences may indicate that the California collections represent a different taxon. At this time, however, I do not believe that these differences are large enough to warrant the description of a new taxon. *Amaurochaete comata* was described originally from Romania. Eliasson (1977) reported it from France and Sweden and Farr (1982) reported it from Alaska. Thus, although *A. comata* seems to be rare, it has a wide distributional pattern.

COLLODERMA OCULATUM (Lipert) G. Lister. — Mendocino Co.: MacKerricher Beach State Park, on rotting wood covered with leafy liverworts, 31 Mar 1972, 12318, 12322, and 23 Mar 1972, 12316. In each of these collections, the substrate was originally collected because it had another, larger myxomycete on it. The small sporangia of *C. oculatum* were discovered later in the laboratory while the substrate was being scanned with a stereoscopic microscope. The outer gelatinous layer, unique to the genus, is scantily developed in these collections. Additionally, the spores are warted rather than echinulate as given in Martin and Alexopoulos (1969). *Colloderma oculatum* is a poorly known species; until more material is available for study, I believe it is best to take a conservative taxonomic approach and to enlarge the species concept to include the California collections. *Colloderma oculatum* is known only from a few collections in the United States. This is due undoubtedly to its small size and to it growing among bryophytes on dead wood, hidden from view. When investigators study lignicolous bryophytes thoroughly for slime molds, I predict that *C. oculatum* will be found more commonly than heretofore thought.

MACBRIDEOLA ARGENTEA Nannenga-Bremekamp & Yamamoto. — Butte Co.: 2 mi ne. of Magalia, on bark of *Cupressus macnabiana* A. Murray in moist chambers, 28 Oct 1978, *Whitney* 997, 1006, 1012 and 7 Mar 1979, *Whitney* 1062; Deer Creek Canyon, 7.5 mi w. of Ponderosa Way, on bark of *Vitis californica* Benth in moist chamber, 4 Apr 1977, *Whitney* 418; Los Angeles Co.: Santa Catalina Island, Avalon, on bark of *Cypressus* sp. in moist chamber, 2 Sep 1978, *Whitney* 963. Within the genus, *M. argentea* can be

distinguished by its persistent peridium, long stalks that are three-fourths to four-fifths the total height, and spores having clusters of larger and darker warts. As Nannenga-Bremekamp and Yamamoto (1983) have indicated, this species probably is most closely related to *Lamproderma biasperosporum* Kowalski. Both species have hollow stipes, persistent peridia, and spores with warts of two sizes. They can be differentiated most easily on the bases of the capillitium and sporangial size. In *M. argentea*, the sporangia are approximately 0.1 mm in diameter and the capillitium is reduced, consisting of two or three branches of the columella that also branch 3–5 times and infrequently anastomose to form a weak but dark brown net. In *L. biasperosporum*, the sporangia are 0.25–0.5 mm in diameter and the capillitium is more highly developed, being formed from numerous branches of the columella, which radiate and branch many times in all directions. These branches also anastomose infrequently to form a weak, but decidedly whitish, net. Previously, *M. argentea* had been known only from moist chamber developments made from several locations in Japan. It may have been collected in the past, however, and incorrectly identified as *L. biasperosporum*. Hence, it could be much more common than previously thought.

MACBRIDEOLA MARTINII (Alexopoulos & Beneke) Alexop. — Lassen Co.: Eagle Lake Field Station, developed on bark of *Juniperus occidentalis* Hooker in a damp chamber, 23 May 1977, *Whitney* 426. This collection was assigned to *M. martinii* because it is the only species in the genus with a completely evanescent peridium and spores with clusters of larger and darker warts. Whitney's collection, however, may represent an undescribed taxon because it differs in several respects from the published descriptions of *M. martinii*. In typical *M. martinii*, the stipes are long, usually 5–10 times the diameter of the sporangia, the columella is tapering, the capillitium is smooth, and the spores are 6.5–8.0 μm in diameter. In Whitney's material, however, the stipes are only 2–4 times the diameter of the sporangia, the columella is broad and scarcely tapering, the capillitium bears conspicuous bead-like outgrowths, and the spores are much larger, 10.5–12.0 μm in diameter. Because typical *M. martinii* has been found apparently only in Jamaica, Dominica, Gambia, and Kentucky, and it is rare, I believe it prudent to consider Whitney's material an extreme variant of *M. martinii* and to wait for additional material to become available before reaching a final conclusion as to the disposition of the California form.

COMATRICHA ELLAE Härkönen. — Butte Co.: 5 mi e. of Stirling City, 4000 ft., on decayed wood, 19 Aug 1965, 2006; Chico, Lower Bidwell Park, on decayed wood, 18 Nov 1966, 3907; Lassen Co.: Eagle Lake Field Station, on bark of *Juniperus occidentalis* in a moist chamber, 20 Jun 1977, *Whitney* 511; Los Angeles Co.: Santa Catalina Island, Avalon, on bark of *Cupressus* sp. in a moist chamber,

2 Sep 1978, *Whitney* 962. The major features of this taxon are the small size (less than 1.0 mm in total height), globose sporangia, capillitium that forms a distinct surface net with few free ends, and the relatively long stipes that are 3–4 times the diameter of the sporangia. The California material is typical in all respects. When originally described by Härkönen (1977, as *C. nannengae*), *C. ellae* was known only from Norway and Finland. It has been reported since from Spain (Nannenga-Bremekamp and Lado 1985) and probably will be discovered wherever bark of living trees is cultured.

COMATRICA LONGIPILA Nannenga-Bremekamp.—Sutter Co.: Sutter Buttes, on bark of living *Quercus* sp., 29 Jan 1969, 9841. This collection was made in the field, not in a moist chamber. *Comatricha longipila* appears to be most closely related to *C. laxa* Rost. Both taxa are relatively common on the bark of living trees and have sporangia that are globose to elongate in shape. Additionally, the main branches of the capillitium arise at right angles to the columella, and a distinct surface net is lacking. There are two major differences between these species: in *C. laxa*, the spores are 7–11 μm in diameter and the capillitium terminates in numerous short, free ends; in *C. longipila*, the spores are 6–7 μm in diameter and the capillitium has long free ends at the periphery. Although reported from several localities in Europe, this report appears to be the first record for North America.

COMATRICA PENICILLATA Nannenga-Bremekamp & Yamamoto.—Nevada Co.: Donner Summit, 7200 ft., on dead wood, 24 Jun 1971, 11537. The distinctive characteristics of this species include jet-black, globose sporangia that are less than 0.2 mm in diameter with unbranched, or sparsely branched, capillitial threads ending in slight expansions. As Nannenga-Bremekamp and Yamamoto (1983) indicate, it is similar to *Paradiacheopsis fimbriata* (G. Lister) Hertel, and the two species can be differentiated as follows: in *P. fimbriata*, the columella is stout and not tapering, the capillitium radiates in all directions, and the spores are 10–14 μm in diameter; in *C. penicillata*, the columella tapers, the capillitium is brush-like, and the spores are 7.0–9.0 μm in diameter. In the original description, the height of the sporangia is listed as 0.8–1.0 mm and the spores are given as 7.0–8.5 μm in diameter. The California collection differs from the type collection, which was made in Japan (apparently the only other known collection), by having sporangia up to 2.0 mm in height and spores 8–9 μm in diameter.

PARADIACHEOPSIS CRIBRATA Nannenga-Bremekamp.—Sonoma Co.: 3 mi ne. of Asti, Thompson Property, on bark of *Quercus* sp. in moist chamber, 22 Jul 1978, *Whitney* 930; 25 Nov 1978, *Whitney* 1022. Both *P. cribrata* and *P. acanthodes* (Alexopoulos) Nannenga-Bremekamp have small sporangia, 0.6 mm or less in total height, and strongly spinose spores, 12–14 μm in diameter. In *P. cribrata*,

the capillitial threads are numerous, stout, and anastomosed at the surface so that a rigid network is formed. In *P. acanthodes*, the capillitial threads are fewer in number, finely pointed, and do not fuse to form a peripheral net. This appears to be the first report of *P. cribrata* from the Western Hemisphere.

PARADIACHEOPSIS MICROCARPA (Meylan) Mitchell.—Butte Co.: 2 mi ne. of Magalia, developed on bark of *Cupressus macnabiana* in moist chamber, 28 Oct 1978, *Whitney 1019*; Lassen Co.: Eagle Lake, 2 mi s. of Little Troxel Point, developed on bark of *Juniperus occidentalis* in moist chamber, 18 Jul 1977, *Whitney 699*. The major features of this taxon are the small sporangia, less than 1.0 mm in total height, the primary branches of the capillitium that arise at right angles to the columella and end in fine threads bearing short, spine-like processes, and the spinulose or minutely warted spores, 11–13(–14) μm in diameter. Meylan (1921) originally described this taxon (as *Comatricha laxa* var. *microcarpa*) from three collections made from the same tree in the Jura Mountains of Switzerland. Thus, these two collections appear to represent only the fourth and fifth known specimens and the first from the Western Hemisphere.

PARADIACHEOPSIS RIGIDA (Brândză) Nannenga-Bremekamp.—Butte Co.: Chico, corner of Arcadian and Sowilleno avenues, on palm stem in moist chamber, 17 Nov 1966, 3887; Chico, Lower Bidwell Park, on bark of *Juglans* sp. in moist chamber, 10 Jan 1977, *Whitney 295*; 2 mi ne. of Magalia, on bark of *Cupressus macnabiana* in moist chamber, 28 Oct 1978, *Whitney 1013*; Marin Co.: San Rafael, Lucas Valley Road and US Highway 101, on dead wood, 13 Jan 1977, *Whitney 248*. *Paradiacheopsis rigida* appears to be related most closely to *P. microcarpa*. Sporangia of the two taxa look very similar under a stereoscopic microscope. They can, however, be distinguished by numerous characters. In *P. rigida*, the sporangia attain 1.25 mm in total height; the base of the stipe is distinctly yellowish; most of the capillitium originates from the apex of the columella; the branches are dichotomous, flexuose, and occasionally anastomosed; and the spores are 9–10 μm in diameter and minutely spinulose. In *P. microcarpa*, however, the sporangia are smaller, rarely reaching 1 mm; the stipe is black along its entire length; the capillitium arises evenly along the length of the columella; the branches are extremely rigid, completely free, and not dichotomous; and the spores are 11–13(–14) μm in diameter and distinctly warted. *Paradiacheopsis rigida* has been reported in the United States only from Minnesota (Hagelstein 1944).

DIDYMIACEAE

DIDERMA EFFUSUM (Schweinitz) Morgan.—Alameda Co.: Berkeley, University of California Campus, on dead leaves and herbaceous

stems, *E. E. Morse*, 22 Jan 1930. This distinctive species is characterized by flat sporangiate to plasmodiocarpous fructifications that contain minutely warted spores with clusters of larger, darker warts. *Diderma effusum* is generally common throughout its worldwide distribution; therefore, it is interesting that I have never found it in over 20 years of collecting in California. This collection appears to be the only record for the state.

DIDYMIUM BAHIENSE Gottsberger. — Humboldt Co.: Trinidad, College Cove, on fallen leaves, 20 Apr 1973, 12753; Mendocino Co.: MacKerricher Beach State Park, on dead leaves, 29 Dec 1967, 7629, 7641; Albion, on fallen leaves, 11 Apr 1968, 8205, 8225. This species was originally described from Brazil (Gottsberger 1968) and has been reported from the Netherlands (Nannenga-Bremekamp 1972) and England (Mitchell 1977). These collections appear to be the first reports from North America. The features that delineate this taxon are the yellowish stipes, the distinctive whitish to yellowish pseudocolumellae, and the minutely warted spores with clusters of larger, darker warts. It appears to be similar to *D. megalosporum* Berkeley & Curtis, but in that species the pseudocolumella is usually spiny or roughened and the spores lack the distinct clusters of larger and darker warts.

DIDYMIUM VERRUCOSPORUM Welden. — Butte Co.: Chico, Upper Bidwell Park, on dead grass leaves, 17 Jan 1969, 9828; Glenn Co.: 13 mi s. of Hamilton City, on dead dicot leaves, 24 Feb 1968, 7861, 7864. The nodding, globose sporangia containing white, globose columellae and warted spores with clusters of larger warts easily separates this species from others in the genus. *Didymium verrucosporum* was described originally from Panama (Welden 1954) and has been found in various European and Asian localities. These collections appear to be new records for the United States. The California material differs from the type in that, in addition to the warts, the spores bear a wide-meshed reticulum with four or five meshes per spore. The reticulum is very similar to the one illustrated for *Didymium nigrisporum* by Nannenga-Bremekamp et al. (1984).

LEPIDODERMA AGGREGATUM Kowalski. — Tehama Co.: Wells Cabin Campground, 6300 ft., on decaying bark near the melting snow, 18 Jun 1966, 3570. This distinctive alpine slime mold is characterized by sessile, clustered, buff sporangia 1.5–3.0 mm in diameter, which contain spores with widely scattered spines. Until now, it was known only from the state of Washington, where it is extremely common in the spring near melting snowbanks.

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