

**OCCURRENCE OF *MOBERGIA CALCULIFORMIS*
(PHYSICIACEAE, LECANORALES) IN THE
NORTHERN VIZCAINO DESERT OF
BAJA CALIFORNIA, MEXICO**

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Key Words

Mobergia, Physciaceae, lichenized Ascomycetes, ecology chorology,
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Abstract

Mobergia calculiformis (WEB.) MAYRH. et SHEARD (Physciaceae), previously known from Isla Guadalupe, one location near San Diego, and another in Baja California Sur, is reported as a frequent species in peninsular Baja California Norte from ridges above Punta Rocosa north to near Campo Nuevo. This distribution corresponds closely to that of the Northern Vizcaíno Desert floristic province. The vegetation of this area and that of the desert-chaparral ecotone to the north are briefly discussed with regard to the distribution of *M. calculiformis*.

* Dedicated to Prof. Dr. GERHARD FOLLMANN on occasion of his 65th birthday and retirement from the University of Cologne, Germany, relating to his numerous contributions on lichen ecology and taxonomy.

Introduction

The life forms of Baja California plants are as striking as the landscape. A wide variety of fruticose and squamulose lichens also occur along the coast, especially in the Northern Vizcaíno Desert, and with the columnar vascular forms, provide another striking aspect to the "botanical wonderland" of Baja California. Among these is *Mobergia calculiformis* (WEB.) MAYRH. et SHEARD (*Rinodina calculiformis* WEBER), a distinctive growth form of Physciaceae that might easily be mistaken for Roccellaceae (e. g., *Roccellina*).

The genus *Mobergia*, only recently recognized (MAYRHOFER et al. 1992), includes two species, both of which occur on Isla Guadalupe and in peninsular Baja California and California. Outside of Isla Guadalupe, *M. angelica* (STIZENB. in HASSE) MAYRH. et SHEARD is widely distributed from 68 km north-east of Ciudad Insurgentes to near San Francisco (MAYRHOFER et al. 1992), whereas *M. calculiformis* has been known from only a few widely scattered sites, one near San Diego, California, and another in the Sierra de la Giganta about 68 km NE of Ciudad Insurgentes (MAYRHOFER et al. 1992). Nevertheless, *M. calculiformis* is indeed a frequent species on rocks in the Northern Vizcaíno Desert as will be shown in this paper.

Material and Methods

More than 3000 lichen collections have been obtained from the coastal regions of peninsular Baja California and several islands (Isla Santa Margarita, Isla Cedros) during 1985 - 1994. These studies have focused on a taxonomic revision of *Niebla* (SPJUT 1990, 1994); however, specimens of *Mobergia calculiformis* were frequently collected. Representative vouchers were deposited at BCMEX, COLO, KOELN, and US. The first quantitative analysis of secondary compounds was performed by HUNECK and SCHMIDT (1995), using a mass collection from a ridge south of El Marrón between Punta Prieta and Punta Rocosa (28° 46' N, 114°, 22' W; PSJ; 9 967): major compounds norstictic acid (2.94% d. w.) and atranorin (0.25% d. w.), together with various undetermined minor compounds.

Descriptions of vegetation types are from literature (SHREVE 1964, TURNER and BROWN 1982, WIGGINS 1960) and our observations while collecting plants for antitumor screening in Baja California during 1 - 6 week expeditions conducted almost yearly from 1979 - 1994 (SPJUT 1985 a, SPJUT 1995 b ms.); representative voucher specimens of vascular plants were deposited at NA, OSH, US, and herba-

na in Mexico. Phytogeographical maps of the Californian Deserts and Chaparral Region can be found in AXELROD (1979), CRONQUIST (1982), GENTRY (1978), SHREVE (1964), TURNER and BROWN (1982), and WIGGINS (1980).

Results

Mobergia calculiformis was collected in peninsular Baja California on rocks from near Punta Rocosa (28° 45' N, 114° 18' W; SPJ 10 294) north to near Campo Nuevo (20° 41' N, 115° 34' W; SPJ 12 742, near Punta San Fernando). It was found most abundantly just north of Puerto Catarina (29° 31' N, 115° 16' W; SPJ

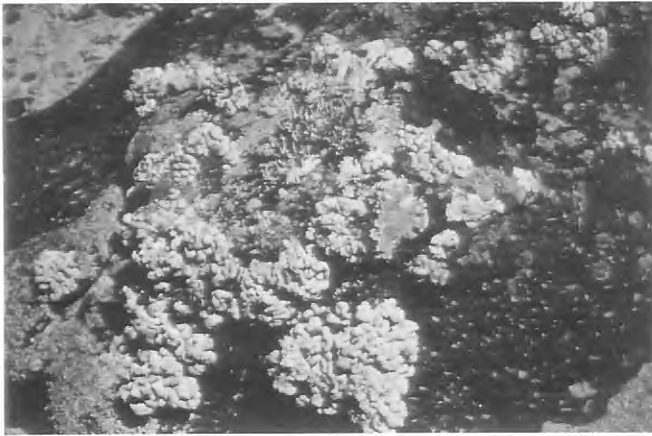


Fig. 1: Close-up of *Mobergia calculiformis* associated with *Niebla* sp. (note similarity with *Reinkella* or *Roccellina*)



Fig. 2: Vicinity of Punta Escarpada, north of Puerto Catarina, looking east directly above the Pacific Ocean; the dominant lichen, especially on the ridges of the rocks, is *Mobergia calculiformis*

13 041) above oceanic cliffs rising 200 m or more where it was observed as the dominant lichen on loose volcanic rocks and on polished siliceous rocky pavements associated with a basalt flow (figs. 1, 2). From this location it extended inland for one or more km up steep coastal slopes of mountains to perhaps 300 m elevation (fig. 2). With exception to the ORCUTT collection reportedly near San Diego (MAYRHOFER et al. 1992), its distribution in peninsular Baja California is primarily in the Northern Vizcaíno Desert floristic province with an isolated occurrence in the Southern Vizcaíno Desert.

Discussion

Lichens are a conspicuous part of the coastal vegetation in Baja California (NASH et al. 1979, RUNDEL et al. 1979, RUNDEL 1978) due to the regular occurrence of fog (BAILEY 1930), especially in the open desert scrub. The more conspicuous lichens include species of *Niebla*, *Ramalina*, *Dendrographa*, *Roccella*, *Teloschistes*, *Trichoramalina*, *Dirina*, *Lecanora*, *Caloplaca*, *Heterodermia*, *Physcia*, *Parmotrema*, *Xanthoparmelia*, *Usnea*, and *Mobergia*. The greatest diversity of lichens is generally found where orographic fog is most pronounced such as on elevated peaks of "puntas" or headlands near Bahía de San Quintín, Punta San Carlos, Punta Canoas, Punta Negra, and Punta Rocosa, although variation in topography and substrate also contribute to species diversity.

The coastal physiographic features in the Northern Vizcaíno Desert include flat-topped volcanic hills of andesite and basalt with abrupt steep slopes to the ocean, acute volcanic ridges, precipitous limestone cliffs bordering the sea, sandstone terraces, lava rubble beaches, barren silt hills, saline barren flats around bays, and sandy bays and dunes (DURHAM and ALLISON 1960). These features are interspersed throughout an undulating coastline of the Northern Vizcaíno Desert that extends from Punta Baja to near Punta Santa Domingo, e. g., one can encounter large dune systems and marine deposits near the peaks of volcanic outcrops at 500 - 800 m as well as on the beaches near sea level. Roads along much of the coast are dirt tracks that are severely eroded, and best driven by four-wheel drive; the coastal region between Puerto Catarina and Punta San Carlos is accessible only by foot. The Northern Vizcaíno Desert Province is recognized as the center of diversity for the lichen genus *Niebla*; 28 of 39 species in North America are found there (SPJUT 1995 b ms.), compared to 16 species in the Channel Islands, 17 species in the ecotone, and 11 species in the Southern Vizcaíno Desert.

The vascular plant vegetation of the Northern Vizcaíno Desert contains many botanical oddities in which many are endemic to Baja California. One of the more striking is the boojum tree, *Idria columnaris* KELL., a frequent species that stands out like telephone poles among the low scrub; closely associated are *Viscainoa geniculata* (KELL.) GREENE, *Pachycormus discolor* (BENTH.) COVILLE var. *pubescens* (S. WATS.) GENTRY, *Agave cerulata* TREL., *Yucca valida* BRANDEGEE, *Ambrosia bryantii* (CURRAN) PAYNE, *Acanthogilia gloriosa* (BRANDEG.) DAY et MORAN, *Harfordia macroptera* (BENTH.) GREENE et PARRY, *Prosopidiastrum mexicana* (DRESSL.) BURKART, and *Xylonagra arborea* (KELL.) DONN.-SMITH et ROSE sub. *wigginsii* MUNZ. These and others represent a wide variety of life forms that include much-branched spiny shrubs (*Lycium* spp., *Calliandra californica* BENTH., *Fouquieria diguetii* [VAN TIEGH.] I. M. JOHNST., columnar cacti like *Pachycereus pringlei* [S. WATS.] BRITT. et ROSE, *Myrtillocactus cochal* [ORCUTT] BRITT. et ROSE, *Lophocereus schottii* [ENGELM.] BRITT. et ROSE), succulent spiny-leaved plants (*Agave* spp., *Yucca* spp.), succulent-stemmed non-spiny shrubs (*Euphorbia misera* BENTH., *Pedilanthus macrocarpus* BENTH.), grotesque looking trees with enlarged trunks and much-branched crowns (*Pachycormus discolor*), subshrubs with large fleshy tubers (*Xylonagra arborea*), and broad-leaved deciduous shrubs (*Viscainoa geniculata*, *Ambrosia chenopodiifolia* (BENTH.) PAYNE, *Solanum hindsonianum* BENTH., *Encelia* spp., *Viguiera laciniata* GRAY). The evergreen creosote (*Larrea tridentata* [SESSÉ et MOC. ex DC.] COVILLE), a species that is typically found throughout much of the Sonoran Desert, is infrequent or absent in many areas, and would seem to be replaced by jojoba (*Simmondsia chinensis* [LINK.] SCHNEIDER).

The northernmost occurrence of *Mobergia calculiformis* near Punta San Fernando corresponds closely to that of the northern boundary of the Northern Viscaíno Desert where contact is made with the coastal chaparral-desert ecotone. The vegetation in the ecotone that extends north to near Colonet varies according to substrate, and is generally a low, open scrub having a mixture of desert succulents (e. g., *Agave shawei* ENGELM., *Dudleya ingens* ROSE, *Ferocactus* spp., *Mamillaria diocia* BRANDEGEE, *Echinocereus maritimus* [M. E. JONES] K. SCHUM., *Bergerocactus emoryi* [ENGELM.] BRITT. et ROSE, *Euphorbia misera* BENTH.) and shrubs (e. g., *Eriogonum fastigiatum* PARRY, *Frankenia palmeri* S. WATS., *Rosa minutifolia* ENGELM. in PARRY, *Ambrosia chenopodiifolia*) that show affinities to Californian coastal sage species. Terricolous species of *Niebla* usually form a ground cover between the shrubs and may characterize up to 75% of the land-

scape vegetation (RUNDEL et al. 1972). This is in contrast to saxicolous *Niebla* communities that are a characteristic feature of the Northern Vizcaíno Desert. Additionally, species commonly associated with California chaparral north of San Vicente (e. g., *Rhus laurina* NUTT., *Aesculus parryi* GRAY, *Acalypha californica* BENTH., *Adolphia californica* S. WATS.) occur southwards disjunctly along the coastal mountains to Punta Rocosa, while those associated with the North Gulf Desert communities (e. g., *Larrea*, *Fouquieria splendens* ENGELM., *Dalea spinosa* GRAY, *Encelia farinosa* GRAY) extend sporadically along arroyos that lead to Puerto Catarina of the Pacific Coast, and also southwards to near Punta Cono.

Mobergia calculiformis seems to occur more frequently where moisture from fog phases is reduced but humidity remains relatively high. This is also evident in two other fruticose species of lichens that are generally associated with *M. calculiformis*, one is an undescribed species of *Niebla* characterized by having small tufts of inflated branches, and the other, also unknown, is related to *Vermilacinia robusta* (HOWE) SPJUT et HALE (SPJUT 1990, 1995 a). Both are common in the Northern Vizcaíno Desert and extend northwards to the chaparral-desert ecotone of peninsular Baja California and the Channel Islands (SPJUT ms.). Above Punta Negra, *M. calculiformis* was found on leeward side of ridges near the crest at 400 - 500 m. The peaks that connect these ridges appear to receive more precipitation from fog than those generally encountered elsewhere along the coast and they support several species of Ramalinaceae that are of limited occurrences between Punta Rocosa and Punta Cono. One is a species of *Niebla* characterized by being deficient in key metabolites, while the other belongs to *Vermilacinia* (SPJUT 1990, 1995 a). Near Puerto Catarina, *M. calculiformis* occurred along the inner part of the undulating coastline where precipitation from fog appears much less than that might be received at the extended puntas to the north and south.

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