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**High Altitude Mosses from Mauna Kea,
Island of Hawaii**

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INTRODUCTION

During a trip to the top of Mauna Kea in the fall of 1949, Mr. Otto Degener made quite a few moss collections, including the following five species new to the Hawaiian moss flora: *Rhabdoweisia denticulata*, *Encalypta rhabdocarpa*, *Desmatodon convolutus*, *Grimmia laevigata*, and *Timmia bavarica*. These additions are all representative of the temperate regions of North America and pose quite an interesting problem in phytogeography, suggesting the possibility that the prevailing northeast trade winds and the migration routes of birds have some bearing on their presence in Hawaii. Following is a selected list of the more interesting species in Mr. Degener's series, which, coupled with the collections previously made by Miss Marie C. Neal and Dr. Constance E. Hartt [Bartram, Supplement to the manual of Hawaiian Mosses, B. P. Bishop Mus., Occ. Papers 15 (8): 93-108, 1939], gives a reasonably clear outline of the moss flora of these high altitudes. Any further substantial additions to the Hawaiian moss flora will no doubt come from the high slopes of Mauna Kea and Mauna Loa and from the rim and crater of Haleakala.

One set of Mr. Degener's mosses will be deposited in the herbarium of the New York Botanical Garden, another set in the herbarium of Bernice P. Bishop Museum, and a partial series, including the species listed below, in my herbarium.

DITRICHACEAE

Distichium capillaceum (Hedwig) Bryologia europaea, fasc. 29-30. 1846.

Hawaii: Mauna Kea, east of Halepohaku, at 8,500 ft., on rocks. Sept. 4, 1949, *no. 19888*; near top of Mauna Kea, in cave at 12,000 ft., Sept. 3, 1949, *no. 19911*.

Ceratodon purpureus (Hedwig) Bridel form **xanthopus** (Sullivant) E. G. Britton, North American Flora **15** (1): 61, 1913.

Hawaii: Mauna Kea, north of Pohakuloa, on ground in arid region, *no. 19900*.

DICRANACEAE

Dicranella rigidula Bartram, B. P. Bishop Mus., Bull. **101**: 30, 1933.

Hawaii: rainswept plateau at head of Alakahi Valley, Kohala, on rock at 3,800 ft., *no. 19901* in part.

Amphidium cyathicarpum (Montagne) Brotherus, Engler and Prantl Pflanzenfam. **1** (3): 460, 1902.

Hawaii: Mauna Kea, northeast of Halepohaku, in lava crevices at 9,500 ft., *no. 19859*; near top of Mauna Kea, in cave at 12,000 ft., *no. 19909*.

Rhabdowesia denticulata (Bridel) Bryologia europaea, fasc. 33-36. 1846.

Hawaii: along Saddle Road 21 miles from Hilo, on rocks in rich, rainy *kipuka* [oasis in lava flow], *no. 19930*.

Distribution: Europe, North America, Japan.

New to Hawaiian Islands.

ENCALYPTACEAE

Encalypta rhabdocarpa Schwaegrichen, Suppl. **1**: 56, 1811.

Hawaii: near top of Mauna Kea, on rocks in cave at 12,000 ft., *nos. 19898, 19910* in part.

Distribution: Europe, Asia, North America.

New to Hawaiian Islands.

POTTIACEAE

Desmatodon convolutus (Bridel) Grout, Moss Fl. of North America **1** (4): 224, 1939.

Hawaii: Mauna Kea, north of Pohakuloa, on ground, *nos.* 19844, 19856, 19903 in part.

Distribution: Europe, Asia, Africa, North America, South America, Australia, Tasmania, New Zealand.

New to Hawaiian Islands.

Tortula alpina (Bryologia europaea) Bruch var. **inermis** (Milde) De Notaris, *Épil. Briol. Ital.*, 544, 1869.

Hawaii: Mauna Kea, Puu Laau, at 7,500 ft., *no.* 19862.

GRIMMIACEAE

Grimmia laevigata (Bridel) Bridel, *Bryol. univ.* 1: 183, 1826.

Hawaii: Mauna Kea, north of Pohakuloa, on rocks, *no.* 19904.

Distribution: Europe, Asia, Africa, North America, Australia, Tasmania, New Zealand.

New to Hawaiian Islands.

Grimmia haleakalae Reichardt, *Sitzber. Akad. Wiss. Wien* 75: 567, 1877.

Hawaii: Mauna Kea, Puu Oo, *no.* 19936.

Ptychomitrium mauiense Brotherus, *B. P. Bishop Mus., Bull.* 40: 18, 1927.

Hawaii: Kealaohu, on rocks, *no.* 19938a.

BRYACEAE

Mielichhoferia pulvinata C. Müller, *Flora* 82: 439, 1896.

Hawaii: Mauna Kea, near Puu Oo, on bank, *no.* 19944; Mauna Kea, Puu Oo, on rock, *no.* 19919 in part; Mauna Kea, *no.* 19943.

Pohlia cruda (Hedwig) Lindberg, *Musci Scand.*, 18, 1879.

Hawaii: Mauna Kea, east of Halepohaku, at 8,500 ft., *no.* 19888a.

Pohlia gracilescens (Bartram) Bartram, new combination.

Webera gracilescens Bartram, *B. P. Bishop Mus., Bull.* 101: 109, 1933.

Hawaii: along Saddle Road, 23.5 miles south of Hilo, entrance to cave, *no.* 19835a.

Pohlia leucostomoides (Brotherus) Bartram, new combination.

Webera leucostomoides Brotherus, *B. P. Bishop Mus., Bull.* 40: 14, 1927.

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Hawaii: rainswept plateau at head of Alakahi Valley, Kohala, on rocks at 3,800 ft., *no.* 19905.

TIMMIACEAE

Timmia bavarica Hessler, *Comment. de Timmia*, 19, 1822.

Hawaii: Mauna Kea, east of Halepohaku, at 8,500 ft., on rocks. *no.* 19888*b*.

Distribution: Europe, Asia, North America.

New to Hawaiian Islands.

HYPOPTERYGIACEAE

Hypopterygium sandwicense Brotherus, *B. P. Bishop Mus., Bull.* 40: 25, 1927.

Hawaii: along Saddle Road 21 miles from Hilo, on rock in rich, rainy *kipuka* [oasis in lava flow], *no.* 19929.

ENTODONTACEAE

Entodon Hillebrandi C. Müller, *Flora* 82: 461, 1896.

Hawaii: Kealaohu, on rocks, *no.* 19938.