

Appearance of the "heathii" Aberration and Genitalic Variation in a *Mitoura* Population from Oregon (Lycaenidae: Theclinae)¹

Clifford D. Ferris²

Bioengineering Program, University of Wyoming, Laramie, WY 82071-3295

Abstract. A juniper-association *Mitoura* species (ascribable to *barryi barryi* Johnson) experienced a population explosion in eastern Oregon in June, 1990. Substantial variation in the female genitalia was observed. Two of the female specimens collected manifested the ventral surface "heathii" aberration occasionally found in genus *Satyrium* Scudder.

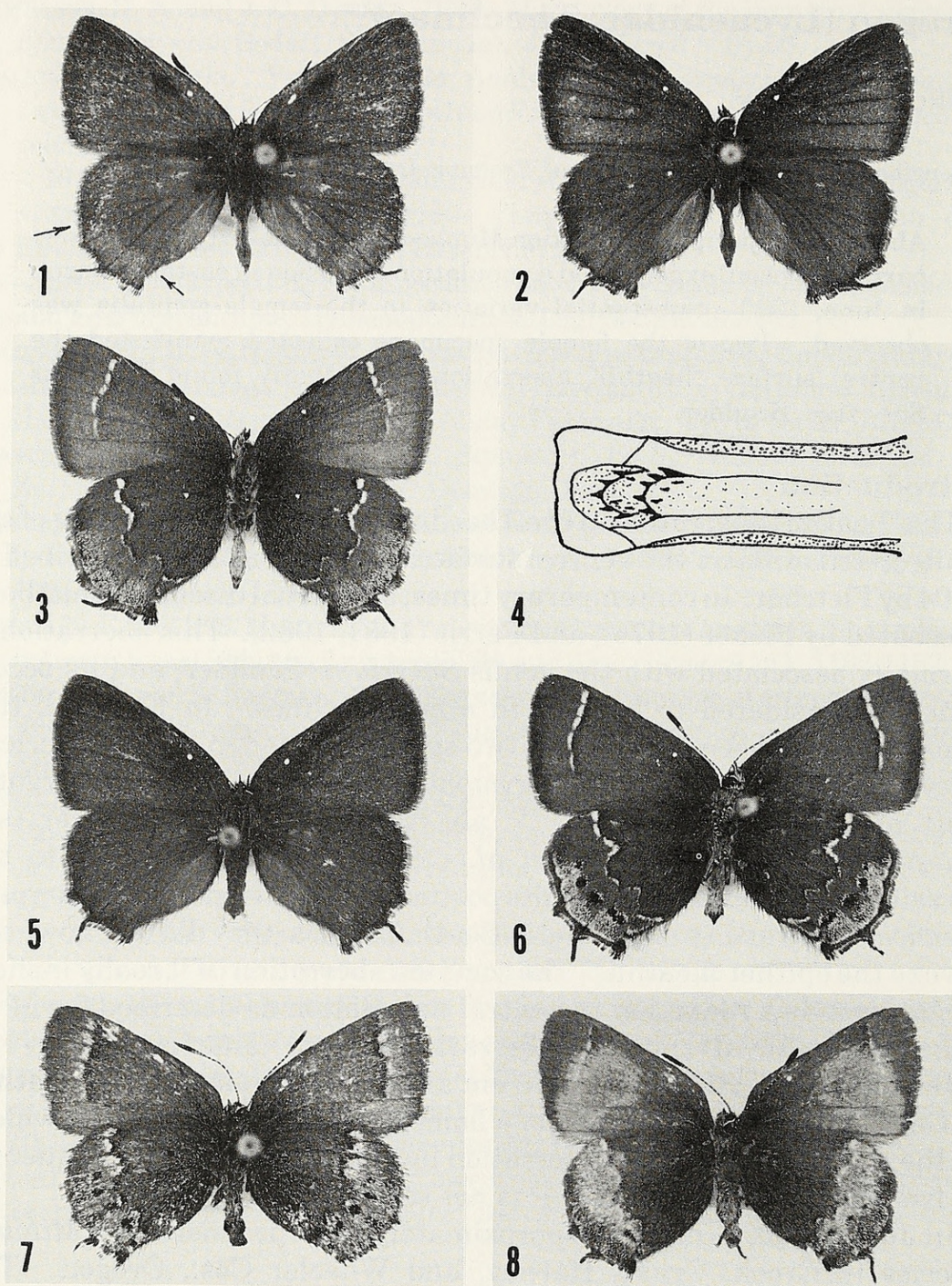
Introduction

The "heathii" aberration in the Theclinae, which is a broadening of the white maculation on the ventral surfaces of the wings, was described in 1904 by Fletcher. In contemporary times, additional discussion has been presented by Fisher (1976), and Ferris (1981, 1982). This aberration is normally associated with the genus *Satyrium* Scudder, and its occurrence is considered to be rare in other theclines. In England, this aberration has been observed in two species related to North American *Satyrium*. These species are *Strymondia w-album* ♀ ab. "albovirgata" Tutt and *Quercusia quercus* ♀ ab. "latefasciata" Courvoisier (see Russwurm, 1978). Johnson *et al.* (1990) have also alluded to the occasional manifestation of "white postmedial suffusions" in the *Strymon eremica* (Hayward) group found in South America; they did not, however, invoke the epithet "heathii." The common aberration (if it really is such) in *Mitoura* is a reduction in ventral maculation as described for *M. n. nelsoni* (Boisduval) and given the varietal [form] name "exoleta" by Hy. Edwards (1881). Based upon current and limited evidence, the "heathii" variant may be the expression of a homologous allele that occurs widely in the tribe Theclini. This aberration appears to occur more frequently in females than in males, but it is not sex restricted.

In June, 1990, I collected approximately 375 specimens of a *Mitoura* species in Crook, Grant, Harney, and Wheeler Cos., Oregon. The population which I sampled is ascribable to *Callophrys (Mitoura) barryi barryi* Johnson, based upon the discussion in Johnson (1976), and this assignment will be discussed subsequently. This species experienced a population explosion, and could be found virtually everywhere that

¹Published with the approval of the Director, Wyoming Agricultural Experiment Station as Journal Article No. JA 1635.

²Research Associate: Allyn Museum of Entomology/Florida Museum of Natural History, Sarasota, FL; Florida State Collection of Arthropods, DPI, FDACS, Gainesville, FL. Research Associate in Entomology, Natural History Museum of Los Angeles County, Los Angeles, CA.



Figs. 1-4. Males of *Mitoura b. barryi* from Grant Co., Oregon, Malheur Nat. For., N. of Mt. Vernon, 24 vi 90. Dorsal surfaces (1-2); ventral (3). Tip of aedeagus (4).

Figs. 5-6. Dorsal (5) and ventral (6) surfaces of typical females of *Mitoura b. barryi* from Harney Co., Oregon, Malheur Nat. For. along For. Rd. 2820, 28.vi.90.

Figs. 7-8. Ventral surfaces of two aberrant females of *Mitoura b. barryi* from Oregon. (7) Harney Co., Malheur Nat. For. along For. Rd. 2820, 28 vi 90. (8) Grant Co., Malheur Nat. For., N. of Mt. Vernon, 24 vi 90.

Juniperus o. occidentalis Hook. occurs within the altitudinal range from 1250-1680 m. Adults were observed perching on juniper shrubs and sipping nectar on a variety of flowers, although there was a definite preference for yellow composites. The number of specimens collected provided an ample study series. Other than the ventral form "exoleta", no unusual male specimens were taken. As is discussed below, there are two normal dorsal-surface phenotypes in the adult males. There is little variation in the dorsal wing surfaces of the females, and the ventral "exoleta" form occurs regularly, as in the males. Two females were found which exhibit the "heathii" aberration.

John Lane (*pers. comm.*) has indicated that occasional specimens from the San Bernardino Mts. population of juniper-feeding *Mitoura* exhibit a tendency toward the "heathii" phenotype. These specimens, however, are uncommon.

The genitalic discussion which follows below should not be construed as having any bearing upon the "heathii" aberration. It is a general discussion relative to the Oregon population sampled.

Photographic Records

Figs. 1-3 illustrate typical males from the Oregon population sampled. In the form shown in Fig. 1, the dorsal surface is pale grayish-brown and the FW "thecla" patch shows prominently. There is also a prominent rusty marginal band extending from the anal angle of the HW (arrows in photograph). The form shown in Fig. 2 manifests an almost uniform dark ruddy-brown color, and the "thecla" patch is obscure. Fig. 3 illustrates the typical ventral pattern found in the males.

Figs. 5-6 show, respectively, the dorsal and ventral maculation found in normal females. The dorsal color is a warm ruddy-brown. Figs. 7-8 illustrate the ventral surfaces of the two aberrant specimens which manifest the "heathii" aberration. Their dorsal surfaces (not illustrated) are normal. The specimen shown in Fig. 7 is a partial expression of the aberration, while it is fully developed in the specimen shown in Fig. 8. Note the FW broad pale areas, and the extensive widening of the normally thin post-discal band such that it merges with the submarginal band. In round numbers, these two aberrant specimens constitute approximately 1% of the females collected.

Host Plant Association

By way of summary, Johnson (1976) segregated the western North America populations of *Mitoura* whose larvae feed upon the Cupressaceae as follows: *nelsoni muii* (Hy. Edwards) on *Cupressus sargentii* Jepson; *nelsoni nelsoni* on *Libocedrus decurrens* Torr.; *loki* (Skinner), *siva* ssp. on *Juniperus* sp.; *rosneri* Johnson on *Thuja plicata* Wats. Two of his taxa were referred to "suspected" hosts; *byrnei* to *Thuja plicata*, and *barryi* to *T. plicata* or *Juniperus occidentalis*. *M. barryi barryi* was described from specimens collected in Grant, Union, and Wallowa Cos., Oregon, and

Moscow Mt., Latah Co., Idaho. Regarding the host plant of *barryi*, Johnson stated: "The larval foodplant is unknown."

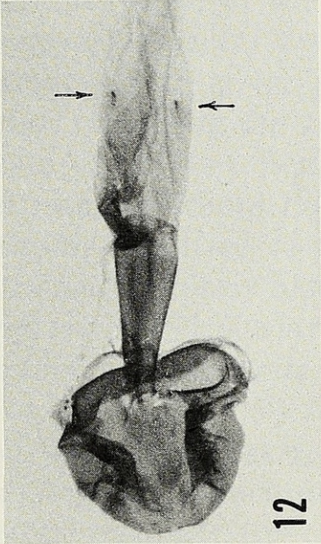
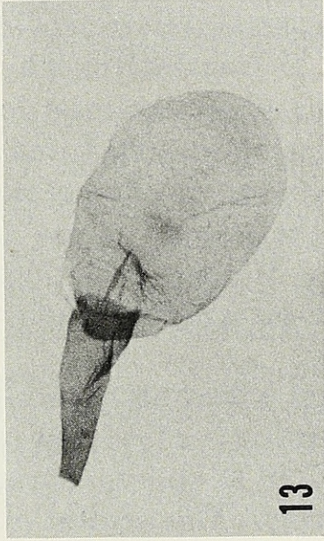
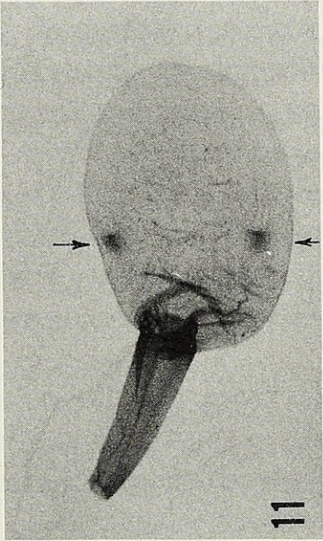
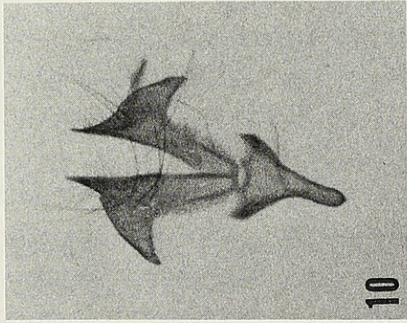
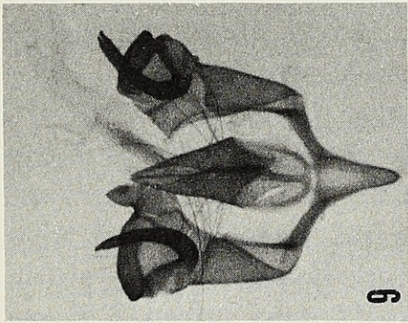
If one ignores Johnson's genitalic descriptions (see discussion below), and accepts his descriptions of the maculation of the imagines, then *M. b. barryi* is the species that I collected and it is associated with *J. o. occidentalis*. This butterfly is more widely distributed in Oregon than Johnson indicated. Its range extends south into Harney Co., and west into the Ochoco Mts. of Wheeler and Crook Cos. In the mountains within this geographic area, there are dry habitats that apparently lie in the rain shadow of surrounding peaks. These sites support stands of Juniper, and this is where *barryi* occurs.

I can not verify Johnson's records for *barryi* on Moscow Mt., Latah Co., Idaho. I have collected in June what is referable to *byrnei* on *T. plicata* on Moscow Mt., where this butterfly is relatively common. I have collected a similar population, also in June, on *T. plicata* in Idaho Co., Idaho. Again the butterflies were widely distributed and common. The *Thuja*-association *Mitoura* occur in a much more mesic environment than do the *Juniperus*-feeding *Mitoura*.

Based upon my collections, and extensive discussions with John Lane who has been studying this group for some years, it seems to make more sense to classify the Cupressaceae-feeding *Mitoura* on a biological basis as opposed to questionable genitalic characters. These butterflies partition very nicely with regard to host plant. Upon further study, it is very likely that chemical races will be identified, that is local populations of *Mitoura* on hosts with chemical components (essential oils, etc.) specific to geographic locality. How one handles the "classical" taxonomy of such entities is another matter, while the biological basis of classification (butterfly to host) is relatively simple. General discussions of butterfly and plant coevolution may be found in Spencer (1988).

Genitalic Variation

In his 1976 discussion of *Mitoura*, Johnson primarily based his taxonomic assignments upon genitalic characters. In the interim since this paper appeared, various specialists have questioned the validity of these characters for making species assignments. The dissections that I have made of males of this Oregon population vary from the findings for *barryi* reported by Johnson, but agree with anecdotal reports and information provided to me by C. S. Guppy and J. Lane. Typical structures are illustrated in Figs. 4, 9-10. Fig. 4 is a drawing of the tip of the aedeagus. Because of the very small size of the structures involved, I was not able to evert the vesica. The two "cornuti" that Johnson described are actually two surfaces with spines or processes along their perimeters. The spines are shaped much like rose thorns. In the preparations that I made, the ventrad perimeter typically supported six major spines, and the dorsad perimeter five. Lesser spines of variable number were noted basad of the major processes.



Figs. 9–10. Male genitalia of *Mitoura b. barryi* from Grant Co., Oregon, Malheur Nat. For., N. of Mt. Vernon, 24 vi 90.
Figs. 11–12. Female genitalia with signa from two specimens of *Mitoura b. barryi* from Oregon. (11) Harney Co., Malheur Nat. For. along For. Rd. 2820, 28 vi 90. (12) Grant Co., Malheur Nat. For., N. of Mt. Vernon, 24 vi 90.
Figs. 13–14. Female genitalia without signa from two specimens of *Mitoura b. barryi* from Oregon. Harney Co., Malheur Nat. For. along For. Rd. 2820, 28 vi 90.

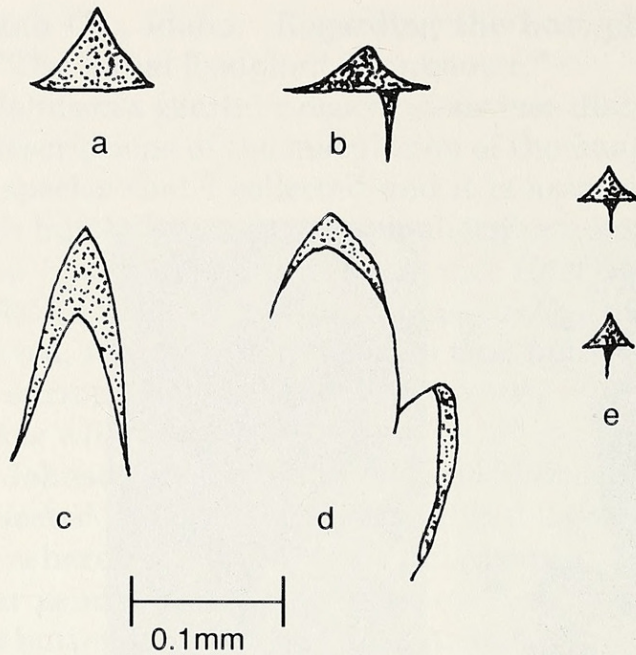


Fig. 15. Five signa forms found in female genitalia of *Mitoura b. barryi* from E. Oregon.

The photomicrograph shown in Fig. 9 is a male preparation minus the aedeagus. The uncus has been split to provide a dorsal-view mount. The saccus is funnel shaped, as was described by Johnson for *barryi*, but the juxta is narrow-rimmed and parabolic as Johnson described for *byrnei*. Note that Johnson defined these structures as the "saccus valvae." The photographs shown represent only two of the dissections that I made. I did not find the form of the "saccus valvae" that he described for *barryi*. The valvae shown in Fig. 10 have been flattened to illustrate their full surfaces. Generally their form agrees with that described by Johnson for *barryi*.

Among females, I found substantial variation from that described by Johnson for *barryi* regarding the presence of signa in the corpus bursae of the genitalia. Figs. 11-14 are photomicrographs of the corpus bursae of four different specimens. The genital plate with extraneous tissue removed is also shown in Fig. 12. Of 18 preparations, only 12 (67%) contained signa (arrows in Figs. 11-12). Figs. 13-14 illustrate bursae lacking signa. The forms of the signa found are shown in Fig. 15. The signa are very small, as the 0.1 mm scale indicates. The triangular form shown in Fig. 15 (a) corresponds to Fig. 11. The actual structures in the bursae of Fig. 11 are very much smaller than the darkened areas that appear in the photograph. The preparations have been stained with Chlorazole Black E. Figs. 15 (c) and 12 correspond. Based upon my study of the female genitalia in the Oregon population of *barryi* sampled, there are at least five forms of the signa when they are present; however, the corpus bursae is frequently devoid of signa.

The signa in the female genitalia of *Thuja*-association *Mitoura* from Idaho and Latah Cos., Idaho were also examined. In both size and form, they were found to be similar to those of *barryi* from the Oregon localities cited above.

Concluding Discussion

There are several schools of thought regarding the taxonomy of genus *Mitoura* [or *Callophrys* (*Mitoura*)]. At one extreme, is Scott's (1986) lumping of all but two of the western *Mitoura* (*sensu stricto*) into the single species *gryneus* (Hübner). At the other extreme, is Johnson's separation (1976) of the genus into a variety of species based upon phenotype, host plant association, and presumed uniformity of genitalic characters within given populations. Various studies are currently in progress regarding the genus *Mitoura* in western North America. In addition to my own field studies, John Lane and C. S. Guppy (*pers. comm.*), among others, have been rearing material sampled from various geographic localities. Johnson's studies are apparently continuing as well (*in litt.*). Guppy has reared two species from the same locality on Vancouver Island; the larvae of one feed on *Thuja* sp., while those of the other feed on *Juniperus* sp. According to Guppy, these two *Mitoura* species are respectively ascribable (tentatively) to *rosneri* Johnson and *barryi*. Before publishing his results, however, he is searching for solid morphological characters that will provide positive species separation. The occurrence of juniper-association and red-cedar-association *Mitoura* in close proximity is apparently not uncommon in British Columbia. I have series of each taken a decade ago in the upper Okanagan Valley, and additional records exist.

Based upon contemporary studies, and the data that are emerging from them, it is evident that much additional work remains to elucidate the relationships among the various western *Mitoura*. This is especially true of the populations found along the eastern perimeter of the Great Basin, and in the Intermountain Region. It is clear that there is considerably more variability in the genitalia than was initially reported. Because of this variability within given colonies, I suggest that genitalic characters are of little use in making species assignments within the Cupressaceae-feeding group of *Mitoura*. Based upon current data, biological classification of this group, as opposed to genitalic classification, appears to be the sensible approach.

In addition to reporting the occurrence of the "heathii" aberration in a *Mitoura* species, the object of this paper is to document the wing patterns and genitalic characters of *Mitoura b. barryi* indigenous to four Oregon counties. It is further suggested that species partitioning of *Mitoura* should be based upon biological and not genitalic characters.

Acknowledgments. I wish to thank Drs. R. J. Lavigne and R. E. Pfadt of the Dept. of Entomology, Univ. of Wyoming for critically reading a preliminary draft of this paper. My thanks also to John Lane (Santa Cruz, CA) and to C. S. Guppy (Vancouver, BC) for sharing their information and opinions with me. I wish also to acknowledge suggestions from Kurt Johnson, who was an external referee for this paper. The genitalic studies reported were conducted using an Olympus SZ3060 zoom stereo microscope fitted with a 100AL 2X auxiliary lens to provide magnification to 250X. Dimensions were scaled using Olympus H10/10 and H10/100 eyepiece micrometers

Literature Cited

- DORNFELD, E. J. 1980. The Butterflies of Oregon. Timber Press, Forest Grove, OR.
- EDWARDS, H. 1881. On some apparently new forms of diurnal Lepidoptera. *Papilio* 1:50-55.
- FERRIS, C. D. 1981(1982). Field notes on four western hairstreaks (Lycaenidae: Theclinae). *J. Lepid. Soc.* 35(4):325-330.
- 1982(83). Polymorphism in *Satyrium calanus* (Huebner) from Wyoming and Colorado (Lepidoptera: Lycaenidae: Theclinae). *J. Res. Lepid.* 21(3):188-193.
- FISHER, M. S. 1976. The *heathii*-white banding aberration in the Strymoninae (Lycaenidae). *J. Res. Lepid.* 15(3):177-181.
- FLETCHER, J. 1904. Descriptions of some new species and varieties of Canadian butterflies. *Can. Ent.* 36(5):121-130.
- JOHNSON, K. 1976. Three new Nearctic species of *Callophrys* (*Mitoura*), with a diagnosis of all Nearctic consubgenera (Lepidoptera: Lycaenidae). *Bull. Allyn Mus.* (38):1-30.
- JOHNSON, K., EISELE, R. C., AND B. MACPHERSON 1990. The "hairstreak butterflies" (Lycaenidae, Theclinae) of northwestern Argentina II. *Strymon*, *sensu stricto*. *Bull. Allyn Mus.* (130):1-77.
- RUSSWURM, A. D. A. 1978. Aberrations of British Butterflies. E. W. Classey, Ltd., Oxon, England.
- SCOTT, J. A. 1986. The Butterflies of North America. Stanford University Press, Stanford, CA.
- SPENCER, K. C., ed. 1988. Chemical Mediation of Coevolution. Academic Press, Inc., San Diego, CA.



Ferris, Clifford D. 1991. "Appearance of the 'heathii' aberration and genitalic variation in a *Mitoura* population from Oregon (Lycaenidae: Theclinae)." *The Journal of Research on the Lepidoptera* 30(1-2), 113–120.

<https://doi.org/10.5962/p.266638>.

View This Item Online: <https://www.biodiversitylibrary.org/item/224734>

DOI: <https://doi.org/10.5962/p.266638>

Permalink: <https://www.biodiversitylibrary.org/partpdf/266638>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: In Copyright. Digitized with the permission of the rights holder

Rights Holder: The Lepidoptera Research Foundation, Inc.

License: <https://creativecommons.org/licenses/by-nc-sa/4.0/>

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.