A Monograph of the Lichen Genus
Pseudoparmelia Lynge (Parmeliaceae)

*Mason E. Hale, Jr.*
ABSTRACT

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A Monograph of the Lichen Genus

*Pseudoparmelia* Lynge (Parmeliaceae)

*Mason E. Hale Jr.*

**Introduction**

This world monograph of the lichen genus *Pseudoparmelia* is part of my continuing effort to revise the parmelioid genera. Although these genera are usually lumped under the collective name *Parmelia*, recent studies with the scanning-electron microscope have demonstrated that species previously classified under *Parmelia* fall into two distinct groups, one with a paraplectenchymatous upper cortex and very frequently with pseudocyphellae, typified by *Parmelia saxatilis* (L.) Acharius and including the *P. borreri* group, and another with a palisade plectenchymatous upper cortex and an overlying pored epicortex but never with pseudocyphellae (Hale, 1973a).

The epicorticate group includes several heterogeneous elements differing, for example, in marginal ornamentation (cilia, bulbate cilia), rhizine branching patterns (simple or dichotomously branched), and lobe configuration and width (broad apically rotund to narrow obtuse lobes). These elements are, in my opinion, biologically isolated and represent good genera, as follows: *Bulbothrix* Hale with bulbate cilia and no cortical pigments (Hale, 1974), *Hypotrachyna* (Vainio) Hale with narrow eciliate lobes and dichotomously branched rhizines (Hale, 1975a), *Parmelina* Hale with narrow ciliate lobes (Hale, 1974), *Pannotrema* Massalongo with broad rotund lobes (Hale, 1965a), *Pseudoparmelia* Lynge with narrow eciliate lobes, *Relicina* (Hale and Kurkawa) Hale with bulbate cilia and usnic acid in the cortex (Hale, 1975b), and *Xanthoparmelia* (Vainio) Hale with narrow eciliate lobes and usnic acid in the cortex (Hale, 1974).

As with *Hypotrachyna* (Hale, 1975a) and *Relicina* (Hale, 1975b), much of the initial work on the chemistry of *Pseudoparmelia* was completed before thin-layer chromatography came into use in 1965. Thus it has been necessary to reinvestigate the chemistry of many specimens. Even with the application of the most recent techniques, however, this monograph can be considered definitive only in the broadest sense. Fresh lichen collections are now being made every year in exotic regions, especially in Africa, Australia, and South America, by botanists and more significantly by professional lichenologists, who had not previously collected outside temperate areas and who choose to identify the specimens themselves rather than send them to a monographer.

Under these circumstances, any monograph will be incomplete in two respects. For one, information on new records not available for study will be omitted, records that could profoundly affect interpretations of phytogeography. The older specimens now preserved in herbaria are a pitifully inadequate representation of lichen floras. Secondly, unpublished new species which are sure to be found in a genus as large as *Pseudoparmelia* obviously cannot be included in the keys, and this lack makes species identification more difficult for lichen students. This monograph is offered, then, with full realization of its limitations but with the hope that it will provide a base for later workers.

**Acknowledgments.**—I am much indebted to curators who sent specimens on loan and often allowed considerable extensions of loan periods.
These include Mr. Peter James (BM), Dr. A. J. Kostermans (BO), Dr. A. Robyns (BR), Mr. M. S. Christiansen (C), Dr. W. A. Weber (COLO), Dr. W. L. Culberson (DUKE), Dr. L. Williams (F), Dr. I. M. Lamb (FH), Dr. C. E. Bonner (G), Mr. M. S. Christiansen (C), Dr. W. A. Weber (COLO), Dr. W. L. Culberson (DUKE), Dr. L. Williams (F), Dr. I. M. Lamb (FH), Dr. C. E. Bonner (G), Mr. C. E. Palmar (GLAM), Dr. T. Ahti (H), Dr. H. Schindler (KR), Dr. J. Poelt (M), Dr. H. A. Imshaug (MSC), Dr. C. T. Hildur Krog (O), Dr. E. F. Warburg (OXF), Mme. Jovet-Ast (PC), Dr. C. E. Smith (PH), Dr. S. Ahlner (S), Dr. S. Kurokawa (TNS), Dr. R. Alava (TUR), Dr. I. Tavares (UC), Dr. R. Santesson (UPS), Dr. H. Riedl (W), Dr. J. W. Thomson (WIS), and Dr. G. Cufodontis (TNU). Dr. Ove Almborn (LD) lent his own extensive collections in addition to materials from BOL, L, PRE, and TRH which he had on hand for study. Dr. Z. Cernohorský kindly arranged for loans from BP at a time when travel in Hungary was not permitted. The late Dr. H. des Abbayes (REN) was extremely generous in sending loans as well as duplicates of type-collections of the new species he was describing. For allowing me to examine collections in their private herbaria, I am especially indebted to Dr. D. D. Awasthi, Dr. Gunnar Degelius, Dr. M. Mahu, Dr. T. D. V. Swinscow, and Dr. Rolf Santesson.

The specimens were photographed by the Smithsonian Office of Printing and Photographic Services. Scanning-electron microscope photographs were prepared by the Smithsonian Scanning-Electron Microscope Laboratory.

Dr. S. Kurokawa assisted with species identifications, chemical tests, and descriptions prior to 1961, and his help is gratefully acknowledged. Field studies have been supported at various times by the National Science Foundation, National Geographic Society, Smithsonian Research Foundation, and the Morden-Smithsonian Fund. Cooperative field studies were conducted in India with the Maharashtra Association for the Cultivation of Science, working with Dr. P. G. Patwardhan, and in Venezuela with Dr. M. López-Figueiras of the Universidad de los Andes. Finally, I wish to thank Dr. Ove Almborn for reading the entire manuscript and checking the bibliography and spelling of place names.

Morphology

Thallus.—The thallus is typically foliose, orbicular, 3–15 cm in diameter, and uniformly adnate, even at the margin. The degree of adnation varies from nearly subcrustose in Parmotrema xanthomelaena (Figure 18e) to loosely adnate in Parmotrema caperata. Comparable eilicate species of Parmotrema have wider, more or less marginally erect lobes. Lobe configuration is variable. While some species have sublinear, apically obtuse lobes 0.5–2.0 mm wide (Figures 6b,d, 10e, 12d), an even larger number have subirregular, apically rotund lobes 2–6 mm wide (Figures 6a,c, 9a, 10c, 12c). Lobes in both types are often contiguous and crowded. There is no marginal ornamentation in Pseudoparmelia; the margins are smooth and sometimes black rimmed.

The lower surface of the thallus is either black or pale brown, and this color difference, although variable in some of the saxicolous species, can be an important taxonomic character. Broader lobed species with a black lower surface, such as the well-known Parmotrema caperata, usually have a narrow brown zone at the lobe tips. While most species have a shiny paraplectenchymatous lower surface (Figure 1c), species in the Parmotrema amplexa group (Parmotrema amplexa, P. pachydactyla, and P. subamplexa) have a minutely grained, velvety appearing black lower surface to the margin (Figure 1a,b). This is caused by an irregularly thickened, minutely papillose cell layer sloughing from the lower cortex, a phenomenon which I have not seen in any other parmelioid genera.

Rhizines are uniformly simple and produced in moderate abundance (Figure 1d). The only exception to this rule is Parmotrema intertexta, which usually has pale branched rhizines, not unlike those of some species of Relicina but not as agglutinated (Hale, 1975b). Broader lobed species usually lack rhizines along the margins at lobe tips or at most have a zone of short papillae. The rhizines are often blunt with pale, penicillate tips (Reznik et al., 1968).

The internal structure of Pseudoparmelia presents no unusual features (Figure 2a,c,f). The upper cortex has a basic palisade structure (Figure 2d) and is overlain by a thin pored epicortex (Figure 1e,f), as I had previously discovered by using the scanning-electron microscope (Hale, 1973a). The medullary hyphae are often conspicuously encrusted with lichen substances. The lower cortex is paraplectenchymatous (Figure 2e). In these respects it is identical with the other epicorticate genera in the family.

Vegetative Propagules.—The isidia in Pseudo-
FIGURE 1.—Morphology of *Pseudoparmelia*: *a*, lower surface of *P. amplexa* (Degelius s. n.) (×160); *b*, enlargement of surface in *a* (×1600) with arrow pointing to a papilla; *c*, lower surface of *P. rutidota* (Degelius A-37) (×160); *d*, cross section of *P. malaccensis* to show simple rhizines (Hale 30333) (×140); *e*, surface of *P. tahanensis* showing pored epicortex (Kurokawa 1602) (×400); *f*, enlargement of surface in *e* showing pores and aggregations of crystals of usnic acid (×1600). (All photographs taken with the scanning-electron microscope.)
FIGURE 2.—Morphology of *Pseudoparmelia*: a, longitudinal cross section of *P. venezolana* with arrow in upper right pointing to the epicortex (*Hale 43326a*) (× 390); b, enlargement of epicortex in a (upper arrow) and upper cells of the cortex (lower arrow) (× 4000); c, longitudinal cross section of *P. spodochroa* (*Weber 47220*) (× 370); d, enlargement of upper cortex in c (× 800); e, longitudinal cross section of *P. sphaerospora* (*Culberson 10324*) (× 240); f, enlargement of lower cortex in e (× 800); g, isidia of *P. dahili* (isotype in US) (× 160).
parmelia are quite uniform. Twenty species (P. adspersa, P. amasonica, P. annexa, P. arcana, P. basutoensis, P. caroliniana, P. cinerascens, P. concrescens, P. conlabiosa, P. cyphellata, P. dahlia (Figure 2g), P. eapertata, P. ischnoides, P. malaccensis, P. martinicana, P. neoquintaria, P. salacinifera, P. scoiophylla, P. subortula, and P. venezolana) have normal, cylindrical, simple to sparsely branched isidia. Two additional species (P. pachydactyla and P. papillosa) have abnormally thickened but otherwise normal isidia (Figure 14d). No species have lobulate, procumbent, or ciliate isidia.

Pustules have been described and illustrated for Hypotrachyna (Hale, 1975a), and they are more or less the same in Pseudoparmelia (Figure 7b), very thickened, fragile, hollow isidioid structures which usually break open apically. Some then produce soredia, while in other cases no soredia form. Seven species (P. baltimorensis, P. eruptens, P. geesterani, P. owariensis, P. pustulescens, P. schistacea, and P. zimbaensis) have largely nonsorediate pustules. One species (P. runkiaeri) has heavily sorediate pustules.

Soralia occur in 14 species: P. alabamensis, P. aptata, P. caperata, P. carneopruinata, P. crozalsiana, P. cryptochlorophae, P. epileuca, P. gerlachei, P. labrosa, P. leucoxantha, P. soredians, P. subambigua, P. subamplexa, and P. texana. They are usually orbicular and discrete except in P. caperata, which has coalescent, more diffuse soralia. All are strictly laminal except for P. leucoxantha (Figure 13b), where the soralia are largely submarginal. It is perhaps noteworthy that all of the sorediate species, excepting P. alabamensis, are corticolous; sorediate, obligately saxicolous species are very rare in the genus.

The remaining 32 species lack any vegetative propagules. The older lobes, however, may become lobulate or heavily rugose, as pointed out above, no species have true laminal lobulae (phylloidia) or lobulate isidia. Virtually all of these species are fertile.

Apothecia.—Apothecia, found so far in 47 of the 76 species, are extremely uniform. They are sessile to subpedicellate and 1–3 mm (rarely to 6 mm) in diameter. The disc is always imperforate. The asci contain eight spores, and the bulk of the species have spores in the range of 6–10 μm wide and 7–18 μm long. Pseudoparmelia caperata and P. concomitans have the largest spores, up to 24 μm long.

Chemistry

The chemical constituents of Pseudoparmelia were first summarized by Hale and Kurokawa (1964) on the basis of microcrystal tests. I have retested most of the species with thin-layer chromatography, using solvent systems A and B of C. Culberson (1972) and in large part confirming the earlier results. The lichen substances in the genus are listed below under the presently accepted classification with number of species containing each substance in parentheses.

Aliphatic Acids

Caperatic acid (5)
Protolichesterinic acid (3)
Others (2)

Aromatic Compounds

Orcinol Series
Divaaricatic acid (9)
Evernic acid (1)
Gyrophoric acid (4)
Lecanoric acid (4)
Obtusatic acid (1)
Perlatolic acid (2)

meta-Depsides
Crytochlorophaeic acid (1)
Sekikaic acid (1)
Depsidones
Neoloxodic acid (2)
Norlobaridone (3)

β-Orcinol Series
para-Depsides
Atranorin (55)
Barbatic acid (1)
4-0-Demethylbarbatic acid (1)

Depsidones
Constitic acid (5)
Fumarproctocetraric acid (1)
Norstictic acid (2)
Physodalic acid (2)
Protocetraric acid (25)
Salazinic acid (7)
Stictic acid (8)
Succinprotocetraric acid (1)

Dibenzo furanes

Usnic acid (20)
Anthraquinones

Skyrin (2)
Undetermined (3)

Unidentified substances presumed to be depsides are known in *P. chalybeizans* ("chalybeizans" unknown), *P. chapadensis*, *P. exornata* and *P. papillosa* ("conformata" unknown), and *P. nequintaria* ("quintaria" unknowns). Unidentified depsides or orcinol depsidones are probably present in *P. vanderbylii*. Unidentified yellow pigments have been reported for *P. arcana*, *P. baltinorensis*, *P. condylodias*, *P. cyphellata*, *P. rütidota*, and *P. sphaerospora*, but none of these are accompanied by triterpenoids. Details on these will be found in “Taxonomic Treatment.”

Divaricatic acid, perlatolic acid, and sekikaic acid are all accompanied by 1 to 3 weaker, as yet unidentified spots falling below the main acid. Perlatolic acid may occur mixed with (or even be replaced by) stenosporic acid, but these two substances are not resolved in the solvent systems employed here. Gyrophoric acid always occurs as an accessory with protocetraric acid, never alone, and norstictic is accompanied by salazinic acid or stictic acid.

While I hope to discuss the chemical features of *Pseudoparmelia* in relation to the other Parmelioid genera in a separate article, several chemical traits stand out. The abundance of orcinol series depsides, especially divaricatic acid, is noteworthy and in fact characterizes the genus. The absence of the commoner orcinol series depsidones such as alectoronic acid is significant, as is also the absence of echinocarpic acid, galbinic acid, lichexanthone, and triterpenoids, and the rarity of barbatic acid and norstictic acid.

Ecology and Habitats

Knowledge of the ecology of any lichen group can enhance our understanding of difficult species complexes, and it is best if this knowledge is gained through firsthand experience in the field. Herbarium labels often omit important data on general vegetation, substratum, and elevation. While I have collected specimens of *Pseudoparmelia* in various parts of the world, I have never visited Africa or Australia, two very important centers for the genus. It is still possible, however, to draw a general picture of the ecological requirements of the genus.

It is evident, for example, that *Pseudoparmelia* is best developed in temperate, subtropical, and arid tropical regions at low to mid elevations. This is in contrast to the strong boreal requirements of *Parmelia*, and the highland tropical preferences of *Hypotrichyna* (Hale, 1975a). Only two species, *P. baltimorensis* and *P. caperata*, grow as far north as the southern edge of the boreal forest, although in the Southern Hemisphere *P. gerlachei* occurs in subantarctic localities. At the same time only four species occur with any frequency in humid lowland tropical forests: *P. sphaerospora* in the Americas and Africa and *P. dahlia*, *P. intertexta*, and *P. malaccensis* in Southeast Asia.

*Pseudoparmelia* occurs most abundantly in the arid desert or sclerophyll scrublands of Africa and Australia. In these two regions alone nearly 30 obligately saxicolous species are known and most of them are endemic. The approximately 40 obligately corticolous species in the genus occur mostly in open deciduous secondary forest or in disturbed sites such as pastures, parks, and botanical gardens. About 8 species occur on either rocks or trees, the most typical being *P. texana*. These are generally habitats of great environmental stress with intense insolation and prolonged drought.

*Pseudoparmelia* competes with two other Parmelioid genera: *Parmotrema*, which is mainly corticolous, and *Xanthoparmelia*, a saxicolous group. In South Africa *Parmelia* subgenus *Melanoparmelia* is also well developed on rocks, and as a result *Pseudoparmelia*, *Xanthoparmelia*, and the *Melanoparmeliaceae* often have similar lobe configuration and close thallus adnation. They all have simple rhizines, lack marginal cilia, and rarely produce soredia. It may represent an example of convergent evolution for three genera in these stressed environments.

Another possible example of convergent evolution is represented by the three usnic-acid containing species in the humid lowland forests, *P. dahlia*, *P. intertexta*, and *P. malaccensis*. They occupy the same habitats (in particular canopy branches in dipterocarp forests) and have the same narrow, apressed, sublinear lobes and yellow pigmentation (usnic acid) as *Relicina* (Hale, 1975b) but lack the marginal bulbate cilia.
Formation of Morphs and Chemical Populations

A detailed discussion of morph formation and speciation in *Hypotrachyna* (Hale, 1975a), which applies equally well to *Pseudoparmelia*, has already been presented. Briefly, one assumes that nonfertile isidiate and sorediate morphs have evolved from fertile nonisidiate or nonsorediate parent species and that lacking any means of sexual reproduction the morphs tend to conserve chemical traits. A parent morph may be traced rather easily, may already be modified through the usual genetic changes, or may have become extinct and now be represented only by the vegetative morph. While application of the morph concept may be somewhat arbitrary in actual practice, it has offered a reasonable explanation of species evolution in several foliose genera.

There are seven theoretically possible combinations of parents and vegetative morphs if we consider only soredia and isidia (Figure 3). Pustules, which in any event are not common, would be considered as an offshoot of isidia. In *Pseudoparmelia* the largest category is the 16 fertile species which, as far as we can determine from herbarium collections now available, have not produced any vegetative morphs. Some will undoubtedly be found eventually, but the presumption is that these species (*P. callichroa*, *P. caribaea*, *P. chapadensis*, *P. concomitans*, *P. conylioides*, *P. dahlii*, *P. geesterani*, *P. neouintaria*, *P. owariensis*, *P. rupicola*, *P. somaliensis*, *P. subtiliacea*, *P. trichroa*, *P. Scotophylla*, *P. tortula*, *P. xanthomelaena*, *P. ischnoides*, and *P. zamibensis*—*P. ecaperata*).

Soredia are comparatively rare in *Pseudoparme- lia*. There are four parent species with corresponding sorediate morphs: *P. epileuca*—*P. schelpei*, *P. ferax*—*P. gerlachei*, *P. inhaminensis*—*P. crozalsiana* (tentative), and *P. scrobicularis*—*P. carneopruinata*. Six sorediate species, *P. alabamensis*, *P. aptata*, *P. cryptochlorophaea*, *P. leucoxantha*, *P. soredians*, and *P. subambigua*, appear to have no nonsorediate parent.

Two groups of species have the full complement of morphs: *P. amplexa*—*P. pachydactyla*—*P. subamplexa* and *P. nairobiensis*—*P. concrescens*—*P. texana* (including as well *P. eruptens*). A third series, *P. rutidota*—*P. baltimiorensis* (coarsely pustulate)—*P. caperata* (sorediate), is another possibility but the species here all diverge rather widely from each other in some details.

A final group of four species, *P. martenicana*—*P. raunkiaeri* and *P. conlabrosa*—*P. labrosa*, represent isidiate-sorediate morph pairs but have no fertile parent extant.

Of the remaining species in the genus, *P. geester- ani*, *P. pustulescens*, *P. schistacea*, and *P. zim-
babwensis are pustulate and have no obvious relatives.

There is a particularly interesting group of saxicolous species in South Africa, including *P. molybdiza* (lecanoric acid), *P. spodochozra* (salazinic acid), *P. tortula* (norlobaridone), and *P. vanderbylii* (unknown depsides). They are so similar externally that chemical tests are needed to separate them. While this group may have evolved from a common parent, the chemical evolution has followed very different pathways. The presumptive isidiate morphs of three of these (*P. antzexa, P. scotophylla*, and *P. subtortula*) are also sufficiently similar that chemical tests are required for positive identification.

If one subscribes to the concept of vegetative morphs, it then follows that morphologically identical but chemically different vegetative morphs have evolved from different parents through parallel evolution and are therefore polyphyletic (W. Culberson, 1973). *Pseudoparmelia texana* (divaricatic acid) and *P. aptata* (perlatolic acid), for example, differ in distribution, *P. texana* being pan-temperate whereas *P. aptata* occurs only in the Old World. The two acids involved are para-depsides, divaricatic acid having a C₅H₁₀ side chain and perlatolic acid C₅H₁₁ side chains (Figure 4). Another chemical pair, *P. owariensis* (divaricatic acid) and *P. pustulescens* (sekikaic acid), is confined to the Old World and appears to be sympatric. The acids are particularly interesting since sekikaic acid is a meta-depside and divaricatic acid the homologous para-depside (Figure 4).

Rarer species with chemical differences used as taxonomic characters include *P. dahlii* (lecanoric acid) and *P. rahengensis* (barbatic acid group) in Southeast Asia. *Pseudoparmelia rutidota*, a common species in Australia and southwestern United States into tropical America, contains protocetraric acid; a virtually indistinguishable population, *P. exornata*, contains protocetraric acid with the “conformata” unknown and occurs principally in Uruguay. Other close relatives include *P. ferax*, which contains phylodialic acid, and *P. callichroa*, which contains a fatty acid.

The presence or absence of usnic acid is the main criterion for recognizing *P. nairobiensis* (usnic acid absent in the cortex) and *P. zambiensis* (usnic acid present) and their corresponding isidiate morphs, *P. concrescens* and *P. ecaperata*.

**Phytogeography**

The *Pseudoparmelia* floras of various geopolitical units are listed below. Many countries are so poorly collected, of course, that no meaningful floristic comparisons can be made. However, the United States, West Indies, Venezuela, South Africa, and perhaps Brazil and Australia are all rather well known. Several lichenologists are now working in East Africa and Australia, and their studies, when completed, will fill in many gaps.

**North America**

Canada: *P. baltimorensis, P. caperata.*

United States: *P. alabamensis, P. amazonica, P. baltimoren- sis, P. caperata, P. caroliniana, P. crosalsiana, P. crypto-
chlorophaea, P. martinicana, P. rutidota, P. salacinifera, P. sphaerospora, P. texana.*

**Mexico and Central America**


Guatemala: *P. caperata, P. sphaerospora.*

Honduras: *P. amazonica, P. carneopruinata, P. caroliniana, P. cryp- tochlorophaea, P. salacinifera, P. texana.*

Nicaragua: *P. caroliniana.*

Costa Rica: *P. carneopruinata, P. caroliniana, P. sphaerospora, P. texana.*

Panama: *P. caroliniana, P. sphaerospora, P. texana.*
**West Indies**

Bahamas: *P. sphaerospora.*  
Cuba: *P. amazonica, P. caribaea, P. caroliniana, P. salacini-fera, P. sphaerospora.*  
Jamaica: *P. carneoprunata, P. caroliniana, P. cryptochloro-phaea, P. raunkiaeri.*  
Hispaniola: *P. caperata, P. caroliniana, P. cryptochlorophaea, P. inornata, P. martinicana, P. raunkiaeri, P. sphaerospora, P. texana.*  
Puerto Rico: *P. amazonica, P. martinicana.*  
Lesser Antilles and Virgin Islands: *P. caperata, P. cryptochlorophaea, P. inornata, P. martinicana, P. raunkiaeri, P. sphaerospora.*  
Trinidad: *P. amazonica.*

**South America**

Colombia: *P. amazonica, P. carneoprunata, P. salacini-fera.*  
Ecuador: *P. caroliniana.*  
Peru: *P. caperata, P. rutildota, P. sphaerospora, P. texana.*  
Bolivia: *P. rutildota.*  
French Guyana: *P. caribaea, P. sphaerospora.*  
Uruguay: *P. carneoprunata, P. crozalsiana, P. exornata, P. papillosa, P. rutildota, P. texana.*  
Paraguay: *P. cinerascens, P. scrobicularis.*  
Argentina: *P. caperata, P. carneoprunata, P. crozalsiana, P. gerlachei, P. papillosa, P. rutildota, P. scrobicularis, P. sore-dians.*  
Chile: *P. caperata, P. ferax, P. gerlachei, P. labrosa, P. rutildo-ta, P. soredians, P. subambigua, P. texana.*

**Europe and Africa**

Europe: *P. caperata, P. caroliniana, P. carneoprunata, P. crozalsiana, P. soredians.*  
Tunisia: *P. caperata.*  
Guinea: *P. ecapera, P. pustulescens, P. rodrigueziana, P. sphaerospora.*  
Ivory Coast: *P. caroliniana, P. ecapera, P. malaccensis, P. owariensis, P. rodrigueziana, P. texana.*  
Cameroon: *P. sphaerospora.*  
Ethiopia: *P. aptata.*  
Somalia: *P. somalensis.*  
Urundi: *P. somalensis.*  
Zaire: *P. concrescens, P. crozalsiana, P. sphaerospora.*  
Rhodesia: *P. subampexa, P. tortula.*  
Malawi: *P. ecapera.*  
Zambia: *P. somalensis, P. zambiensis.*  
Tanzania: *P. aptata, P. molybdiza, P. nairobiensis, P. soma-lensis, P. sphaerospora, P. texana.*  
Moambique: *P. concrescens, P. epiuleca, P. eruptens, P. malaccensis, P. schelpei.*  
Madagascar: *P. rodrigueziana, P. somalensis, P. sphaerospora, P. texana.*

**Asia**

India: *P. aptata, P. caperata, P. crozalsiana, P. ecapera, P. malaccensis, P. pustulescens, P. texana.*  
Sri Lanka: *P. dahliaii, P. texana.*  
Thailand: *P. adspersa, P. ecapera, P. owariensis, P. rahen-gensis, P. salacini-fera, P. texana.*  
Laos: *P. caroliniana*  
China: *P. caperata.*  
Japan: *P. aptata, P. caperata, P. owariensis, P. texana.*  
Hong Kong: *P. owariensis.*  
Taiwan: *P. amazonica.*  
Philippines: *P. adspersa, P. intertexta, P. malaccensis.*  
Malaysia: *P. intertexta, P. malaccensis.*  
Indonesia: *P. aptata, P. intertexta, P. malaccensis, P. texana.*  
New Guinea: *P. intertexta.*

**Australia and New Zealand**

New Zealand: *P. caperata, P. labrosa, P. ruti-dota, P. soredians, P. subtiliacea.*

**Pacific Region**

New Caledonia: *P. concomitans.*  
Hawaii: *P. caperata, P. texana.*

The greatest concentration of species is found in South Africa. This region with adjacent countries has a flora of 35 species, nearly half of the species in the genus (Figure 5). At least 15 of these are endemic and most saxicolous. Australia, a region of similar climate and vegetation, has 16 species, of which 5 (P. aptata, P. soredians, P. spodochroa, P. texana, and P. xanthomelaena) also occur in Africa.

In the New World, Brazil has the most species, 18, of which 6 are endemic. North America has 12 species but only 2 (*P. alabamensis* and *P. baltimorensis*) are endemic there.

Temperate and tropical eastern Asia (India to
Japan) has a rather small *Pseudoparmelia* flora of only 14 species, 4 of them endemic and the remainder pantemperate or also widespread in Africa. In general the Old World and New World floras are quite distinct. The Old World, however, is much richer with about 55 species in contrast to the 30 species so far collected in North and South America.

Some idea of the abundance of the various species can be gained by tabulating the number of countries (as listed above) where each species has been reported. This crude method of comparison does not, of course, take into consideration the relative sizes of the countries or the intensity of collecting, but it is unlikely that the order of abundance will be greatly changed by future collecting. The following species occur in five or more countries: *P. texana* (24), *P. caperata* (17), *P. sphaeroospora* (16), *P. caroliniana* (13), *P. amazonica* (9), *P. carneopruinata* (9), *P. crozalsiana* (9), *P. rutidota* (9), *P. salacinifera* (8), *P. ecaperata* (7), *P. aptata* (7), *P. concrescens* (6), *P. cryptochlorophaea* (6), *P. malaccensis* (6), *P. martinicana* (6), *P. soredians* (6), *P. intertexta* (5), and *P. owariensis* (5). Within its range *P. caperata* is undoubtedly the most commonly collected foliose lichen, followed by *P. caroliniana* and in Asia *P. ecaperata*.

Twenty-nine species, nearly half the genus total, have been found so far in only one country, as can be determined from the lists of specimens examined in the species treatment, and while many of these will be found in other countries with more intensive collecting, this great a number reflects the high degree of endemism characteristic of the genus.

**Taxonomic Treatment**

The 76 species of *Pseudoparmelia* are arranged below in alphabetic order. All specimens collected by Hale are deposited in the Smithsonian Institution (US), and the herbarium acronym is not cited for these.

The following key is divided into three sections: isidiate species, sorediate species, and nonisidiate, nonsorediate species.
Keys to the Species of *Pseudoparmelia*

**ISIDIATE**

1. Thallus greenish yellow (usnic acid present).
2. Thallus black below with at most a narrow brown zone at the lobe tips.
3. Isidia thin, no more than 0.2 mm thick; medulla P–.  
   .................  *P. ecaperata*
3. Isidia thick and inflated, 0.3–1 mm thick; medulla P+ red.
4. Lower surface velvety black to the margin.  
   .................  *P. pachydaactyla*
4. Lower surface shiny black with a narrow brown zone at the lobe tips.
5. Isidia dense, cylindrical.  
   .................  *P. papillosa*
5. Isidia irregularly scattered, often breaking open apically.  
   .................  *P. baltimoresensis*

1. Thallus uniformly pale brown below.
   .................  *P. malaccensis*
6. Medulla P–.
7. Medulla C+ red (lcanoronic acid).  
   .................  *P. dahlii*
7. Medulla C– or C+ orange (barbatic acid).  
   .................  *P. rahengensis*

1. Thallus whitish to greenish mineral gray (usnic acid lacking).
8. Collected on trees.
9. Lower surface uniformly pale brown.
10. Isidia moderate to dense, 1 mm high; medulla K+ red (salazinic acid).  
    .................  *P. salacinifera*
10. Isidia sparse, 2–3 mm high; medulla K– or K+ yellow (stictic acid)  
    .................  *P. cyphellata*
9. Lower surface black toward the center and black at the margin or with a narrow brown zone at the lobe tips.
11. Isidia inflated, pustulate, 2–3 mm high  
    .................  *P. eruptens*
11. Isidia not inflated or pustulate, to 1 mm high.
12. Upper surface finely reticulately cracked and strongly white-reticulate  
    .................  *P. caroliniana*
12. Upper surface continuous, not white-reticulate.
13. Medulla P–.
    .................  *P. conlabrosa*
    .................  *P. concrescens*
13. Medulla P+ red or orange.
15. Medulla K+ (salazinic acid)  
    .................  *P. cinerascens*
15. Medulla K–.
16. Fumarprotocetraric acid present.  
    .................  *P. adspersa*
16. Protocetraric acid present.
17. Isidia fragile, crumbling; lobe tips white-reticulate.  
    .................  *P. martinicanana*
17. Isidia normal; lobes not white-reticulate.  
    .................  *P. amazonica*
8. Collected on rocks.
18. Isidia coarse, pustulate, usually erupting apically.
19. Medulla K+ red (salazinic acid).  
    .................  *P. geesterani*
19. Medulla K–.
20. Medulla P+ red (protocetraric acid).  
    .................  *P. zimbabwensis*
20. Medulla P–.
21. Divaricatic acid present.  
    .................  *P. ovariensis*
22. Sekikaic acid present.  
    .................  *P. pustulescens*
22. Caperatic acid present.  
    .................  *P. schistacea*
18. Isidia normal, thin and cylindrical, not pustulate.
23. Medulla P+ red or orange.
24. Lobes 2–3 mm wide, apically subrotund.  
    .................  *P. scotophylla*
24. Lobes about 1 mm wide.
25. Medulla K–; collected in South America.  
    .................  *P. venezolana*
25. Medulla K+ yellow (stictic acid); collected in Africa.  
    .................  *P. ischnoides*
27. Upper surface finely reticulately cracked. .................. P. caroliniana
27. Upper surface continuous and smooth. ...................... P. subtortula
26. Lobes 1–2 mm wide, apically obtuse.
28. Lower surface black. ........................................... P. annexa
28. Lower surface uniformly brown or tan.
29. Thallus very closely appressed. ......................... P. arcana
29. Thallus adnate to loosely adnate.
30. “Quintaria” unknowns present; collected in Australia. .... P. neoquintaria
30. “Quintaria” unknowns absent; collected in Africa.
31. Norlobaridone present. ........................................... P. subtortula
31. Norlobaridone absent. ........................................... P. basutoensis

SOREDIATE SPECIES
1. Thallus greenish yellow (usnic acid present).
2. Lower surface uniformly velvety black below to the margin. .... P. subamplexa
2. Lower surface shiny, black at the center and dark brown in a narrow zone at the lobe tips.
3. Medulla K+ yellow turning red (salazinic acid). ................. P. soredians
3. Medulla K-.
4. Medulla C+ red (lecanoric acid), P-. .......................... P. subambigua
4. Medulla C-, P+ red or orange.
5. Soralia mostly laminal, becoming diffuse. .................. P. caperata
5. Soralia mostly apical or marginal.
6. Soralia generally orbicular; collected in Antarctic regions or the high Andes. ...................... P. gerlachei
6. Soralia elongate along lobe margins; collected in mid-elevation tropical regions. ................ P. leucoxantha
1. Thallus whitish to greenish mineral gray (usnic acid absent).
7. Medulla P+ orange or red.
8. Upper surface broadly reticulately ridged and foveolate (without lens); stictic acid present.
9. Lobes subirregular, 2–5 mm wide. ................................. P. crozalsiana
9. Lobes sublinear, 1–2.5 mm wide. ............................... P. carneopruinata
8. Upper surface smooth and plane; protocetraric acid present.
10. Soredia coarse, densely produced over the upper surface in coalescing soralia. .............. P. raunkiaeri
10. Soredia farinose, produced in discrete orbicular soralia.
11. Collected on rocks ................................................. P. alabamensis
11. Collected on trees .................................................. P. epieuca
7. Medulla P-.
12. Medulla C+ deep red (lecanoric acid) ........................ P. labrosa
12. Medulla C- or C+ fleeting pink.
13. Soralia strongly capitate along lobe margins. ................ P. cryptochlorophaea
13. Soralia not capitate, entirely laminal.
14. Divaricatic acid present ........................................ P. texana
14. Perlatolic acid present ......................................... P. aptata

NONISIDIATE, NONSOREDIATE SPECIES
1. Thallus greenish yellow (usnic acid present; P. chapadensis, P. hypomilta, and P. sphaerospora appear to be greenish yellow but lack usnic acid).
2. Lower surface brown or tan throughout.
3. Collected on trees .................................................. P. intertexta
3. Collected on rocks .................................................. P. chapadensis
2. Lower surface black.
4. Lower surface velvety black to the margin. ........................ P. amplexa
4. Lower surface shiny black and often with a narrow brown zone at the lobe tips.
5. Medulla P-.
6. Collected in Africa .................................................. P. sambiensis
6. Collected in South America ...................................... P. callichroa
5. Medulla P+ red.
7. Physodalic acid present. ..............................  P. ferax
7. Physodalic acid absent.
8. Protocetraric acid present. ..............................  P. rutidota
8. Protocetraric acid and the "conformata" unknown present.  P. exornata
1. Thallus whitish to greenish mineral gray (usnic acid absent; P. chapadensis, P. hypomilta, P. sphaerospora, and sometimes P. violacea appear to be yellowish green but lack usnic acid).
9. Medulla pigmented purple to yellow.
10. Medulla completely deep purple. ..............................  P. violacea
10. Medulla yellow or orange.
11. Medulla completely pale orange-yellow (P. condyloides appears yellow but contains no pigment.) ..............................  P. sphaerospora
11. Medulla pigmented only in the lower half.
12. Collected on rocks. ..............................  P. lecomorpea
12. Collected on trees.
13. Lower surface brown; collected in South America.  P. hypomoraceae
13. Lower surface black; collected in Australia.  P. corrugata
15. Lower surface uniformly brown.
16. Medulla P+ red (protocetraric acid). ..............................  P. somaliensis
16. Medulla P− or P+ faint orange (stictic acid). ..............................  P. sphaerospora
15. Lower surface black (often with a narrow brown zone at the lobe tips).
17. Medulla P−.
18. Collected in Africa; diprismatic acid present. ..............................  P. nairobiensis
18. Collected in Australia and New Zealand; coperatic acid present. ..............................  P. subtiliacea
17. Medulla P+ red or orange.
19. Medulla K+ yellow (stictic acid); surface of lobes reticulately ridged and foveolate (without lens).
20. Lobes 1–2 mm wide; collected in South America.  P. scrobicularis
20. Lobes 2–4 mm wide; collected in Africa.  P. inanhinensis
19. Medulla K− (protocetraric acid).
21. Lobes 1–2 mm wide. ..............................  P. schelpei
21. Lobes 3–6 mm wide.
22. Medulla C−; collected in the West Indies ..............................  P. inornata
22. Medulla C+ rose; collected in New Caledonia. ..............................  P. concomitans
14. Collected on rocks.
23. Lower surface uniformly brown.
24. Medulla P+ orange (salazinic acid).
25. "Chalybeizans" unknown present. ..............................  P. condyloides
25. "Chalybeizans" unknown absent. ..............................  P. spodochroa
26. Medulla C+ red (lecanoric acid). ..............................  P. molybdiza
27. Thallus rather loosely attached on rocks and soil; lobes subelongate. ..............................  P. prolata
27. Thallus tightly adnate on rocks; lobes shorter, apically rotund.
28. Norlobaridone present. ..............................  P. tortula
28. Unknown substances present. ..............................  P. randerbylii
23. Lower surface black (brown only in a narrow zone at the lobe tips).
29. Medulla P+ orange or red.
30. Lobes less than 1 mm wide. ..............................  P. xanthomelaena
30. Lobes 2–4 mm wide.
31. Medulla K−; collected in the Caribbean region ..............................  P. caribaeana
31. Medulla K+ yellow or red (salazinic acid); collected in Australia and Africa. ..............................  P. spodochroa
29. Medulla P−.
32. Collected in South America. ..............................  P. rupicola
32. Collected in Africa.
33. Medulla C+ red (lecanoric acid).
33. Medulla C- (divaricatic acid).

Pseudoparmelia

_Pseudoparmelia_ Lyne, 1914:15.

**Type-Species.** _Pseudoparmelia cyphellata_ Lyne, 1914:15.

Lyne erected this genus on the basis of a single collection from Brazil, citing the presence of “pseudocyphellae” on the lower surface as the main difference from _Parmelia_. Santesson (1942) demonstrated conclusively that these are in reality artifacts caused by rhizines that had been torn off, revealing the medulla in irregular patches. He did not reject the genus, as implied in the title of his article, but regarded it as a synonym of _Parmelia_. I do not believe that one could invoke Article 71 of the Code of Botanical Nomenclature here to reject _Pseudoparmelia_. The gashes of dislodged rhizines on the lower cortex are not monstrosities in the accepted sense. Lyne simply described a new genus on a mistaken interpretation of the morphology. In any event, Article 71 was deleted from the Code at the sessions of the International Botanical Congress in Leningrad in 1975. The only lichenologist to use this genus name in practice was Gyelnik (1933), whose species (_Pseudoparmelia aradensis_ and _P. pseudofallax_) have been placed in _Cetrelia_ (Culberson and Culberson, 1968).

_Pseudoparmelia adspersa_

**Figure 6a**


_Parmelia adspersa_ Vainio, 1907:168 [type collection: Lem Ngob, Siam, Schmidt XV (TUR, lectotype; C, islectotype)].
_Parmelia filipina_ Hale, 1972a:99 [type collection: Tagaytay, Cavite, Philippine, Hale 26809 (US, holotype; TNS, UPS, isotypes)].

**Description.**—Thallus closely adnate on rock, ashy white, 2–4 cm broad; lobes narrow and sublinear, contiguous, 0.8–1.2 mm wide; upper surface transversely cracked with age, sorediate, the soralia laminal, capitate; lower surface black, moderately rhizinate, the rhizines black. Apothecia unknown.

**Chemistry.**—Cortex _K_+ yellow, medulla _K_-, _C_-, _KC_-, _P_+ red; atranorin and fumarprotocetraric acid.

**Distribution.**—United States (Tennessee and Alabama).

**Habitat.**—On large sandstone rocks in open deciduous forests at about 300 m elevation.

**Remarks.**—This species is unique among the North American _Pseudoparmeliae_. An African spe-
FIGURE 6.—Species of *Pseudoparmelia*: a, *P. adspersa* (Hale 26809, holotype of *Parmelia filipina* Hale); b, *P. alabamensis* (McCullough 1842 in US); c, *P. amazonica* (Hale 19389); d, *P. amplexa* (Gossweiler 3256e in US); e, *P. annexa* (Almborn 5683, holotype in LD); f, *P. aptata* (Almborn 6548 in LD). (Scale in mm.)
cies, *P. epileuca* (Hale) Hale, also has some rorida and protocetraric acid, but it is corticolous and has broader lobes.

**Specimens Examined.**—United States: Tennessee, Hale 36927.

### Pseudoparmelia amazonica

**Figure 6c**


*Parmelia amazonica* Nylander, 1885:611 [type collection: Santarem, Brazil, Spruce 111 (H, Nylander herbarium number 35111, lectotype; BM, G, NY, W, PC, isolecotypes)].

**Description.**—Thallus closely adnate on bark, 5–10 cm broad, light mineral gray and turning buff in the herbarium; lobes subirregular, apically rounded, 2–6 mm wide, contiguous; upper surface plane, continuous, moderately isidiate, the isidia in the herbarium; lobes subirregular, apically rosette, bare zone near the tips. The sorediate morph of *P. amazonica* is *P. subamplexa* Hale and the isidiate morph is *P. amplexa* Hale.

**Chemistry.**—Cortex K+, yellow, medulla K−, C−, KC+ rose, P+ red; atranorin and protocetraric acid.

**Distribution.**—United States (Florida), Central America, West Indies, Colombia, Venezuela, Brazil, Guinea, and Taiwan.

**Habitat.**—On trees (conifers, palm trees, deciduous trees), *Opuntia*, and on rocks in open forests at 100–1500 m elevation.

**Remarks.**—Superficially this species could be confused with *P. salacinifera* (Hale), which has a pale brown lower surface and salazinic acid. The two occupy very similar habitats (trees in open secondary forests) and geographic ranges.


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### Pseudoparmelia amplexa

**Figure 6d**

*Pseudoparmelia amplexa* (Stirton) Hale, 1974:189.

*Parmelia amplexa* Stirton, 1877:212 [type collection: Somerset East, Union of South Africa, Macowan (BM, lectotype; GLAM, isolecotype)].

*Parmelia caperata* var. *glaucopis* Müller Argoviensis, 1894:258 [type collection: Matangiri, Seen Region, Africa, Stuhlmann 359 (559 on type label) (G, lectotype; BM, isolecotype)].

*Parmelia glaukopis* (Müller Argoviensis) Vainio, 1900:4.

*Parmelia subconspersa* var. *benguellensis* Vainio in Welwitsch, 1901:401 [type collection: Mt. Morro de Lopollo, Huulla, Angola, Welwitsch 31 (BM, lectotype)].

*Parmelia benguellensis* (Vainio) Dodge, 1959:70.


**Description.**—Thallus rather closely adnate on bark, coriaceous, greenish yellow, 3–5 cm broad; lobes sublinear, crowded, partly black rimmed, 1–2 mm wide; upper surface plane, dull, rugose and becoming lobulate with age and heavily pycnidiate; lower surface black and minutely velvety to the margin, sparcely to moderately rhizinate. Apothecia numerous, sessile, 1–2 mm in diameter; spores 8, 7–8 × 16–18 µm.

**Chemistry.**—Cortex K−, medulla K−, C−, KC+, rose, P+ red; usnic acid and protocetraric acid with or without a trace of atranorin.

**Distribution.**—Southern Africa.

**Habitat.**—On trunks and branches of trees in open rocky areas.

**Remarks.**—I had at first identified all African specimens as *Pseudoparmelia rutidota* (Hooker and Taylor) Hale, but close examination showed that they have consistently narrow lobes and a jet black velvety lower surface (Figure 1a, b). By comparison, *P. rutidota*, which is known from Australia and the New World, often has quite broad lobes (to 5 mm wide) and a shiny surface below and brown bare zone near the tips. The sorediate morph of *P. amplexa* is *P. subamplexa* Hale and the isidiate morph is *P. pachydictyla* (Hale) Hale. All three appear to lack any fatty acids, in contrast to the *P. rutidota* group, which usually produces one or more of the common fatty acids.

**Specimens Examined.**—Rhodesia: Kofler (LD, US), Schütte (LD, US), Sheppard 2 (US). Angola: Bié, Gossweiler 3256e (BM, US), Degelius (Degelius herbarium, US); Huila, Degelius (Degelius herbarium); Mexico, Degelius (Degelius herbarium, US).
**Pseudoparmelia annixa**

**FIGURE 6e**

**Pseudoparmelia annixa** (Kurokawa) Hale, 1974:189.

*Parmelia annixa* Kurokawa in Hale and Kurokawa, 1964:151 [type collection: Caledon, Cape Province, Union of South Africa, Almborn 5683 (LD, holotype; isotype in US)].

**DESCRIPTION.**—Thallus tightly adnate on rock, ashy mineral gray, 3–7 cm broad; lobes subirregular to sublinear, 0.7–3.5 mm wide; upper surface plane, shiny, continuous or irregularly cracked with age, moderately isidiate, the isidia mostly simple, about 0.2 mm high, darkening at the tips; lower surface black, sparsely rhizinate. Apothecia adnate, 1.5–5 mm in diameter, the amphithecium isidiate; spores 8,5 × 7–8 μm.

**CHEMISTRY.**—Cortex K+ yellow, medulla K−, C−, KC+ red, P−; atranorin and lecanoric acid.

**DISTRIBUTION.**—Uganda, Angola, and Union of South Africa.

**HABITAT.**—On exposed rock outcrops from sea level to 1200 m.

**REMARKS.**—This rare saxicolous species is the isidiate morph or close relative of *P. molybdiza* (Nylander) Hale, which lacks isidia and has generally broader lobes. Both are African endemics.


**Pseudoparmelia aptata**

**FIGURE 6f**

**Pseudoparmelia aptata** (Krempelhuber) Hale, 1974:189.


*Parmelia asmarana* Vainio, 1898b:37 [type collection: Asmara, Ethiopia, Levaender (TUR, Vainio herbarium number 2664, lectotype)].

*Parmelia nipponica* Zahlbruckner, 1927:353 [type collection: Hachinoche, Japan, Faurie 1239 (W, lectotype)].

**DESCRIPTION.**—Thallus adnate on bark, whitish mineral gray, 6–12 cm broad; lobes sublinear to subirregular, more or less apically rotund, 2–5 mm wide; upper surface plane, continuous or cracked with age, laminally sorediate, the soralia capitate; medulla white except for pale orange pigmentation below the soralia; lower surface black, sparsely rhizinate except for a narrow marginal papillate zone. Apothecia not seen.

**CHEMISTRY.**—Cortex K+ yellow, medulla K−, C−, KC+ red, P−; atranorin, perlatolic acid, and an unidentified pigment.

**DISTRIBUTION.**—Africa, India, Indonesia, Australia, and Japan.

**HABITAT.**—On trees (*Pinus*, deciduous trees), secondary forests at low to mid elevations.

**REMARKS.**—This Old World lichen is externally similar to *P. texana* (Tuckerman) Hale, which contains divaricatic acid and is pantropical-pantemperate. It apparently evolved in the Old World as a chemical variant from a now extinct fertile perlatolic acid-containing progenitor, related perhaps to *P. nairobiensis* (Steiner and Zahlbruckner) Hale. It is basically sympatric with *P. texana* in most of Asia and in Japan comprises about two-thirds of the specimens in this group. Chemical tests must be made to separate the species.


**Pseudoparmelia arcana**

**FIGURE 7a**

**Pseudoparmelia arcana** (Kurokawa) Hale, 1974:189.

*Parmelia arcana* Kurokawa in Hale and Kurokawa, 1964:151 [type collection: Baba, Moçamedes, Angola, Degelius (Degelius herbarium; isotype in US)].

**DESCRIPTION.**—Thallus tightly appressed on rock, ashy white, 3–7 cm in diameter; lobes sublinear, crowded and appearing subareolate toward the center, 0.3–1 mm wide; upper surface plane to convex, continuous to tangentially cracked, moderately isidiate, the isidia mostly simple, about 0.2 mm high; medulla white or in part pale yellow; lower surface brown to pale brown, sparsely rhizinate. Apothecia not seen.

**CHEMISTRY.**—Cortex K+ yellow, medulla K−, C−, KC+ red, P−; atranorin, fatty acids, and unidentified pigments.

**DISTRIBUTION.**—Angola and Union of South Africa.
Habitat.—On rocks in dry open areas at about 1000 m elevation.

Remarks.—This rarely collected species seems to be related to P. annexa (Kurokawa) Hale, which contains lecanoric acid. The yellow pigmentation does not seem to be a consistent character to judge from the few specimens available.

Specimens Examined.—Union of South Africa: Basutoland, Koffer (LD); Cape Province, Höeg (TRH); Orange Free State, Plank (PRE).

**Pseudoparmelia baltimorenensis**

*Figure 7b*

*Pseudoparmelia baltimorenensis* Geynik and Foriss (Hale), 1974:189.

*Parmelia baltimorenensis* Geynik and Foriss in Geynik, 1931a: 167 [type collection: Gunpowder River, Baltimore County, Maryland, Plitt (BP, holotype; US, isotype)].

Description.—Thallus closely to loosely adnate on rocks, yellowish green, up to 15 cm broad but colonies often coalescing and covering extensive areas of rock; lobes sublinear to irregular, apically subirregular, contiguous, 2–3 mm wide; upper surface plane, becoming covered toward the center with large, thick, simple or branched isidioid pustules, fragile and breaking open apically but not becoming sorediate; lower surface black except for a narrow, smooth to rugose, papillate, brown zone along the margins, moderately rhizinate. Apothecia rare, substipitate, 1–3 mm in diameter, the amphithecium pustulate; spores 8, 6–7 μm.

Chemistry.—Cortex K–, medulla K–, C– or C+ rose, KC+ rose, P+ red; usnic acid, protocetraric acid, and very frequently gyrophoric acid.

Distribution.—Eastern United States and adjacent Canada.

Habitat.—Sandstone and granite rocks in open deciduous forests.

Remarks.—This species had been confused with the equally common but usually corticolous *P. caperata* (L.) Hale. The distinction between the coarse laminar pustules of *P. baltimorenensis* and the more or less diffuse soralia of *P. caperata*, as well as the presence of gyrophoric acid as an accessory substance in *P. baltimorenensis*, was recently discovered by Dr. W. L. Culberson (in litt.), who kindly showed me his preliminary results. He is now preparing a paper on the biology of these two species that will present much more detailed information.

Representative Specimens Examined (all in US).—Canada: Ontario, Hale. United States: Massachusetts, Hutchinson 1744; Connecticut, Hale 19076; New Jersey, Hale 17266; Pennsylvania, Becking 57070313, Hale 16292, Heller, White 210; Maryland, Hermann 13768, Leonard 2933, 3086, Norden 27, Plitt; West Virginia, Hale 10734, 15016; Kentucky, Allen 545, Hale 15115; Illinois, Hale 13926, 14029, Shorepa 943; Wisconsin, Hale 23542, Thomson 919; Minnesota, Hale 23479; Missouri, Greenman 4763, Ireland 9258, Schoop 254; Virginia, Hale 15107, Luttrell 120, 4578; North Carolina, Culberson in Lichenes Selecti Exsiccati 915, Hale 16371; Tennessee, Degelius, Hale 31118, Phillips 321; South Carolina, Hale 7747; Georgia, Hale 30877; Alabama, Hale 7129, 33841, McCullough 344, 2082; Mississippi, Hale 7846; Arkansas, Hale in Lichenes Americani Exsiccati 2, Hale 5644, 3813, Moore 259; South Dakota, Vischer 4; Kansas, Hale 2934, 4334; Oklahoma, Hale 5053; Texas, Hale 54517. A number of records in other herbaria would have been identified as *Parmelia caperata* by me before 1970; it was impractical to borrow these specimens again and correct the names.

**Pseudoparmelia basutoensis**

*Figure 7c*


*Parmelia basutoensis* Hale, 1972b:342 [type collection: Roma, Basutoland, Union of South Africa, Koffer (LD, holotype; US, isotype)].

Description.—Thallus adnate on rocks, pale greenish white, 3–5 cm broad; lobes sublinear to subirregular, contiguous, 2–3 mm wide; upper surface plane, isidiate, the isidia cylindrical, simple; lower surface pale brown, sparsely rhizinate. Apothecia sparse, 1–3 mm in diameter, spores not found.

Chemistry.—Cortex K+ yellow, medulla negative with all reagents; atranorin and an unknown substance.

Distribution.—Union of South Africa.

Habitat.—Rocks in dry regions.

Remarks.—As I pointed out in the original description, this species has the general aspect of a *Xanthoparmelia* but lacks usnic acid. The non-isidiate morph and presumptive parent is *P. prolata* (Hale) Hale (see below), but neither species has been collected in sufficient quantity for more definitive statements on biology and possible evolution of the group. The unknown substance appears to be a new fatty acid that reacts faintly yellow with sulfuric acid. The same substance has been discovered in a brown *Parmelia, P. scabrella* Esslinger (Esslinger, 1976).
FIGURE 7.—Species of *Pseudoparmelia*: a, *P. arcana* (Degelius, isotype in US); b, *baltimoren-sis* (Luttrell 3369 in US); c, *P. basutoensis* (Hewitt, holotype in TRH); d, *P. caperata* (Plitt in US); e, *P. caribaea* (Gallo 494, holotype in US); f, *P. carneopruinata* (Hale 42912). (Scale in mm.)
Pseudoparmelia callichroa Kurokawa, new species

DESCRIPTION.—Thallus adnatus, ramulicola, viridi-flavicans, 3–6 cm latus, lobis subirregularibus, congestis, apice subrotundatis; superne planus vel moss irregulariter rugosus, isidiis sorediisque destitutus; cortex superior 10–13 μm crassus, epicortex perforatus, stratum gonidiale 12 μm crassum, medulla alba, 100–120 μm crassa, cortex inferior 12–13 μm crassus; subitus niger, nitidus, modice rhizinosus, rhizinis simplicibus, nigris. Apothecia numerosa, congestis, apice subrotundatis; superne planus vel crassus; subtus niger, nitidus, modice rhizinosus, dulla alba, 100–120 μm crassa, cortex inferior 12–13 μm. Apothecia numerosa, congestis, apice subrotundatis; superne planus vel crassus; subtus niger, nitidus, modice rhizinosus, dulla alba, 100–120 μm crassa, cortex inferior 12–13 μm.

CHEMISTRY.—Cortex K—, medulla negative with all reagents; usnic acid and protolichesterinic acid.

HOLOTYPE.—Chile: Colchagua, Hacienda de Conquenes, P. Dusén 91, 22 August 1896 (S; US, isotype).

DISTRICTION.—Chile.

HABITAT.—On twigs.

REMARKS.—This species would probably be identified as P. rutidota (Hooker and Taylor) Hale without a chemical test (P. rutidota is P+ red with protocetraric acid). The thallus is smaller but we need many more collections to determine whether any morphological characters correlate with the chemical difference.

Pseudoparmelia caperata

Figure 7d

Pseudoparmelia caperata var. subglauca (Nylander in Gasilien) Nylander, 1896:55.
Pseudoparmelia caperata f. laevissima Gyelnik, 1928:387 [type collection: Meleghegy, Fehér, Hungary, Gyelnik (BP, holotype)].
Pseudoparmelia herreana Zahlbruckner, 1929:239 [based on P. flavicans (Tuckerman) Tuckerman].
Pseudoparmelia pseudosorediosa Gyelnik, 1931b:288 [based on Parmelia ochroleuca f. sorediosa Müller Argoviensis].
Pseudoparmelia negativa Gyelnik 1934:301 [type collection: Salisbury Cove, Maine, Plitt (BP, holotype)].
Pseudoparmelia exuptecta (Stirton) Hale, 1974:190.
Pseudoparmelia pseudosorediosa (Gyelnik) Hale, 1974:190.

DESCRIPTION.—Thallus adnate to loosely attached, growing on bark or more rarely on rocks, yellowish green, 5–20 cm in diameter, coalescing to form larger colonies; lobes subirregular, apically rotund, 3–8 mm wide; upper surface plane to undulate or rugulose, continuous, sorediate, the soralia laminal, diffuse and coalescing; medulla rarely orange near the lower cortex; lower surface black, moderately to sparsely rhizinate except for a naked brown rugose zone along the margins. Apothecia very rare, 2–5 mm in diameter; spores 8, 8–13 × 17–24 μm.

CHEMISTRY.—Cortex K—, medulla K—, C—, KC+ rose, P+ red, atranorin, caperatic, protocetraric, and usnic acids; if pigmented, skyrin present.

DISTRIBUTION.—Pan temperate on all major continents (Figure 8).

HABITAT.—On conifers and deciduous trees in temperate forests, common on rocks only at the northern part of its range, from sea level to over 3000 m elevation.

REMARKS.—This is by far the most widespread and commonly collected folioid lichen in all temperate areas of the world. The range in morphological variation is very small and the chemistry remarkably uniform. In eastern North America it can be confused with the primarily saxicolous P. baltimorensis (see discussion above). The presumptive nonsorediate parent seems to be P. rutidota (Hooker and Taylor) Hale (see below).

Older authors consistently placed this species in Parmelia section Amphigynia (= Parmotrema). The lobes, however, are clearly adnate at the margins, the bare rim below is very narrow, the tips of rhizines near the margin are frayed, and the apothecia are adnate and nonperforate. This combination of characters relates the species much more closely to Pseudoparmelia than to Parmotrema.

The species is apparently present in Australia.
and New Zealand, represented by the anonomously pustulate \textit{P. euplecta}. \textit{Parmelia ochroleuca f. sore-diosa}, also described from Australia, is atypical in having rather discrete orbicular soralia. Future studies in this region may show that these populations are distinct from \textit{P. caperata}.

**SPECIMENS EXAMINED.**—See Figure 8 for localities of specimens annotated in the major herbaria. Some specimens from eastern North America which I annotated before about 1972, especially those on rock, will be \textit{P. baltimorensis}.

\textbf{Pseudoparmelia caribaea}


**DESCRIPTION.**—Thallus adnate on rocks, ashy white, rather coriaceous, 6–10 cm broad; lobes irregularly sublinear, often densely imbricate, 3–6 mm wide; upper surface plane or rugulose, cracked with age; lower surface black, moderately rhizinate. Apothecia subpedicellate, at first globose, urceolate at maturity, up to 5 mm in diameter; spores 8, 4–5 × 10–13 μm.

**CHEMISTRY.**—Cortex K+ yellow, medulla K–, C–, KC+ rose, P+ red; atranorin and protocetraric acid.

**DISTRIBUTION.**—West Indies and French Guiana.

**HABITAT.**—On schist and volcanic rocks in open areas up to 275 m elevation.

**REMARKS.**—Except for the two specimens from French Guiana and the Isle of Pines, \textit{P. caribaea} is confined to St. Barthélemy, where it has been collected many times. There are no close relatives in the genus.

**Pseudoparmelia carneopruinata**

*Figure 71*


*Parmelia carneopruinata* Zahlbruckner, 1902:419 [type collection: Rio de Janeiro, Brazil, Höhnel 164 (W, lectotype)].

*Parmelia sbarbaronis* Bouly de Lesdain, 1923:278 [type collection: Catalupe, Varezze, Liguria, Italy, Gesztesi 11467 (F, lectotype)].

**Description.**—Thallus closely adnate, corticolous, greenish mineral gray or in the herbarium buff, 5–9 cm in diameter; lobes sublinear, 1–2.5 mm wide; upper surface strongly reticulately ridged and rugulose, becoming pruinose near the lobe tips, sometimes densely lobulate, sorediate, soralia about 1 mm wide, often coalescing; lower surface black, sparsely rhizinate. Apothecia rare, adnate, 1–4 mm in diameter, the disc pruinose or naked, the pruinose zone along the margins. Apothecia rare, adnate, 1–3 mm in diameter, the disc pruinose or naked, the amphibothecium sorediate; spores 8, 6–9 × 9–13 μm.

**Chemistry.**—Cortex K+ yellow, medulla K+ yellow, C−, KC−, P+ pale orange; atranorin, stictic acid, and constictic acid with associated unknowns.

**Distribution.**—Mexico, Central America, West Indies, Colombia, Venezuela, Brazil, Uruguay, Argentina, and southern Europe.

**Habitat.**—On shade trees in banana and coffee plantations and on deciduous trees in open pastures at 300–2000 m elevation.

**Remarks.**—This species is closely related to *P. scrobicularis* (Krempelhuber) Hale, which is or at least may be the nonsorediate progenitor. Another very close sorediate species, *P. crozalsiana* (Bouly de Lesdain) Hale, has much broader, subrotund lobes and a wider, more temperate distribution. The two species, however, probably intergrade and are not always easily distinguished.


**Pseudoparmelia caroliniana**

*Figure 9a*


*Parmelia caroliniana* Nylander, 1885:614 [type collection: South Carolina, Ravenel 404 (H, lectotype; FH-Tuck, islectotype)].

**Parmelia perlata var. subrevoluta** Müller Argoviensis, 1880:267 [type collection: Petropolis, Brazil, Deventer 45 (G, lectotype)].

**Parmelia isidiophora** Zahlbruckner, 1902:420 [type collection: Botanical Garden, Rio de Janeiro, Brazil, Höhnel 169, (W, lectotype)].

**Parmelia luteola** Zahlbruckner, 1909:170 [type collection: Near Barra Mansa, São Paulo, Brazil, Weitsstein and Schiffner (W, lectotype)].

**Parmelia wilnoana** Lyne, 1914:87 [type collection: Santa Anna da Chapada, Mato Grosso, Brazil, Malme 2453C (S, lectotype)].

**Pyxine azorea** Nylander, 1895:100 [type collection: Acores, Michel 66 (H, lectotype)].

**Description.**—Thallus closely adnate to bark, rarely on rock, 5–10 cm broad; lobes subirregular, rotund, 2–5 mm wide; upper surface plane, reticulately white-maculate and finely cracked, densely isidiate, the isidia 1–3 mm high, often branched; lower surface black, very rarely uniformly dark brown, moderately rhizinate except for a narrow naked or papillate zone along the margins. Apothecia rare, adnate, 1–3 mm in diameter, the amphibothecium isidiate; spores 8, 6–8 × 13–15 μm.

**Chemistry.**—Cortex K+ yellow, medulla K−, C−, KC+ faint rose or purple, P−; atranorin and perlatic acid with associated unknowns.

**Distribution.**—Southeastern United States, Mexico, Central America, West Indies, Venezuela, Ecuador, Brazil, Acores, Africa, and Thailand.

**Habitat.**—On trees (conifers and deciduous trees) in coffee plantations, secondary forest, and pastures and rarely on rocks from sea level to 2800 m elevation.

**Remarks.**—The first study of this species was done by Culberson (1957), who clarified its relation and frequent confusion with *Parmelia rudecta* Acharius, another widespread species which differs in having pseudocyphellae and lecanoric acid as well as a paraplectenchymatous upper cortex. *Pseudoparmelia caroliniana* is the only isidiate species in the genus with perlatic acid; *P. aptata* (Krempelhuber) Hale also has perlatic acid but is sorediate and lacks the fine reticulation so characteristic of *P. caroliniana*. I wish to thank Dr. T. D. V. Swinscow for pointing out the synonymy of *Pyxine azorea*.

**Specimens Examined.**—United States: See Culberson (1957) for localities over the range in the United States and Moore (1968:225) for specimens from Florida. Mexico: Hidalgo,
FIGURE 9.—Species of Pseudoparmelia: a, P. caroliana (Hale 20144); b, P. chapadensis (Malme 2297B, lectotype in S); c, P. cinerascens (Xavier 713 in US); d, P. concomitans (Hill 12091, holotype in BM); e, P. concrescens (Swinscow 2U 24/21 in BM); f, P. condyloides (Aimborn 4882, holotype in LD). (Scale in mm.)
**Pseudoparmelia chapadensis**


_Parmelia chapadensis_ Lynge, 1914:153 [type collection: near Boca da Serra, Serra da Chapada, Mato Grosso, Brazil, Malme 2297B (S, lectotype)].

**DESCRIPTION.**—Thallus closely adnate on rock, yellowish green, 1–1.5 cm broad; lobes sublinear, short, 0.5 mm wide, convex and expanded at the tips; medulla yellowish; lower surface pale brown, moderately rhizinate. Apothecia common, sessile, 0.5–1.0 mm in diameter; spores 8, 4–5 × 8–10 μm.

**CHEMISTRY.**—Cortex _K_+ yellow, medulla _K_+, _C_+, _KC_+ yellowish, _P_+ red; unidentified substances present.

**DISTRIBUTION.**—Brazil.

**HABITAT.**—Rocks in open areas.

**REMARKS.**—This peculiar species is tentatively placed in _Pseudoparmelia_ because the lobes are ecatile and the rhizines simple. Contrary to my earlier findings (Hale, 1960), it does not contain usnic acid or protocetraric acid. The yellow coloration is caused by unidentified pigments in both the cortex and the medulla. Perhaps additional collections will clarify the status of the species.

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**Pseudoparmelia cinerascens**


_Parmelia cinerascens_ Lynge, 1914:104 [type collection: Paraguay, Paraguay, Malme 1498 (S, lectotype)].

**DESCRIPTION.**—Thallus adnate, fragile, ashy mineral gray, 4–5 cm broad; lobes short, becoming imbricate, 1–3 mm wide; upper surface plane, irregularly cracked with age, densely isidiate, isidia cylindrical, simple or branched; lower surface black, rhizines moderate to sparse. Apothecia abundant, adnate; spores 8, _6 × 12_ μm.

**CHEMISTRY.**—Cortex _K_+ yellow, medulla _K_+ yellow turning red, _C_−, _KC_−, _P_+ orange; atranorin and salazinic acid.

**DISTRIBUTION.**—Brazil and Paraguay.

**HABITAT.**—On trees in open forest.

**REMARKS.**—This rare species is superficially near _P. salacinifera_ (Hale) Hale, which differs in having a pale brown lower surface.

**SPECIMENS EXAMINED.**—Brazil: Pernambuco, Xavier 713 (US).

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**Pseudoparmelia concomitans, new species**

_Figure 9d_

**DESCRIPTION.**—Thallus laxe adnatus, corticola, bubalino-albidus, coriaceus, 4–6 cm latus, lobis subirregularibus, apice rotundatis, 3–5 mm latis; superne planus, nitis albo-maculatusque, sorediis et isidiis destitutus; cortex superior 10–14 μm crassus, epicortex sparse perforatus, stratum gonidiale 10–12 μm crassum, medulla 90–110 μm crassa, Cortex inferior 8–10 μm crassus; substipitata, 1–2 mm diametro; sporae 8:nae, 12 × 20–23 μm.

**CHEMISTRY.**—Cortex _K_+ yellow, medulla _K_−, _C_−, _KC_+ red, _P_+ red, atranorin, gyrophoric acid, and protocetraric acid.

**HOLOTYPE.**—New Caledonia: Baie des Crabes, fle de Pins, on fallen branches of *Araucaria cookii*, D. J. Hill 12124 (BM; US, isotype).

**DISTRIBUTION.**—New Caledonia.

**HABITAT.**—On branches of *Araucaria*.

**REMARKS.**—This species is known only from the type collection and seems unrelated to any other _Pseudoparmeliae_. The lobes are coriaceous and strongly white maculate. Only _P. martinicana_ produces this combination of medullary substances but it is an isidiate, fragile lichen confined to the West Indies.
**Pseudoparmelia conlabrosa, new species**

**Figure 10a**

**DESCRIPTION.**—Thallus arcte adnatus, corticola, viridi-albidus, 3–5 cm latus, lobis sublinearibus, apice plus minusue subrotundatis, congestis, 2–2.5 mm latis; superne undulatus, nitidus, apice albo minusve subrotundatis, congestis, 2–2.5 mm latis; superne undulatus, nitidus, apice albo-

**HABITAT.**—On rocks in open dry areas.

**REMARKS.**—This species is obviously related to *Pseudoparmelia labrosa* (Zahlbruckner) Hale, a sorediate species with lecanoric acid also known from Australia. No parent morph has yet been discovered for these two species.

**Pseudoparmelia corrugativa, new combination**

*Parmelia corrugativa* Kurokawa and Filson, 1975:38 [type collection: Near Bulhunnah, South Australia, Rogers 553 (MEL, holotype) (not seen)].
FIGURE 10.—Species of *Pseudoparmelia*: a, *P. conlabrosa* (Weber and McVean L-47102, holotype in US); b, *P. cruzalsiana* (Culberson 6586 in US); c, *P. cryptochlorophaea* (Hale 19771); d, *P. cyphellata* (Malme 2532B, isolectotyope in US); e, *P. dahlitii* (Dahl, isotype in US); f, *P. ecaperata* (Tsuyama 5 in US). (Scale in mm.)
DESCRIPTIoN.—Thallus closely adnate on twigs, whitish mineral gray, about 6 cm broad; lobes irregularly elongate, apically rotund, 1.5–3 mm wide; upper surface rugulose; medulla white in the upper part and deep yellow in the lower half; lower surface black, sparsely rhizinate. Apothecia numerous, 1–4 mm in diameter; spores 8, 7 × 10 μm.

CHEMISTRY.—Cortex K+ yellow, medulla negative with color reagents except for the pigment which is K+ purple, atranorin, and unidentified substances.

DISTRIBUTION.—South Australia.

HABITAT.—On twigs of tree in open area.

REMARKs.—This species is very similar to *P. subtiliacea* (Nylander) Hale, which differs in having a white medulla without pigments but with fatty acids. One additional specimen, which I have not seen, was collected by Rogers (95) in Para Wirra National Park, South Australia. The species is well illustrated in Kurokawa and Filson (1975) (pl. 1: fig. 3).

**Pseudoparmelia crozalsiana**

**FIGURE 10b**


*Parmelia crozalsiana* Bouly de Lesdain ex Harmand, 1909: 555 [type collection: Agde, Hérault, France, De Crosals, May 1909 (US, lectotype)].

DESCRIPTIoN.—Thallus adnate to bark, greenish mineral gray, 5–10 cm broad; lobes subirregular, 3–6 mm wide; upper surface strongly reticulately ridged and wrinkled, sometimes white-pruinose, sorediate, the soralia often produced along the ridges, coalescing; lower surface black, moderately rhizinate except for a narrow brown marginal zone. Apothecia not seen.

CHEMISTRY.—Cortex K+ yellow, medulla K+ yellow, C-, KC-, P+ pale orange, atranorin, stictic acid, constictic acid, and associated unknowns.

DISTRIBUTION.—Eastern United States, Mexico, Brazil, Uruguay, Argentina, France, Italy, Zaire, Union of South Africa, and India.

HABITAT.—On trees in open secondary forests at 100–2000 m elevation.

REMARKs.—I first identified this species in North America in 1960 (Hale, 1960) where it had been misidentified as *Parmelina aurulenta* (Tuckerman) Hale, a ciliate species. Since then it has been recognized from many localities. The lobes are usually quite broad and apically subrotund and the reticulate wrinkles very distinct without magnification. Once the chemistry is recognized, it could only be confused with *Parmelia carneopruinata* (see below), which has lobes less than half as wide on the average. There seems to be no nonsorediate progenitor extant, unless we consider it to be the rare African species *P. inhaminensis* (Dodge) Hale.

When I first examined the surface of this species with the scanning-electron microscope (Hale, 1973a), I noted a strongly nodular surface without pores, an anomalous condition for the genus. However, examination of other species has shown that pores do occur rarely but that even though the species does not seem to have a paraplectenchymatus upper cortex, as one would expect in a nonepicorticate *Parmelia*, the cortical structure of this species is rather atypical.


**Pseudoparmelia cryptochlorophaea**

**FIGURE 10c**


*Parmelia cryptochlorophaea* Hale, 1959:18 [type collection: Ciudad Trujillo, Dominican Republic, Allard 15715a (US, holotype)].

DESCRIPTIoN.—Thallus adnate to appressed on large branches, 5–10 cm in diameter, light mineral gray but soon turning buff in the herbarium; lobes 3–5 mm wide, apically subrotund, crowded; upper surface rugulose and shiny, more or less reticulate white-matulate at the tips, becoming cracked in older parts; margins sorediate, the soredia in dense
erect soralia, 0.6–1.0 mm thick, 1–1.5 mm high; lower surface black and rhizinate at the center, brown and naked to papillose in a narrow zone at the margins. Apothecia rare, 1–3 mm in diameter, spores 8, 4–5 \times 6–9 \mu m.

**CHEMISTRY.**—Cortex K + yellow, medulla K –, C –, KC + rose, P –; atranorin, caperatic acid (C. Culberson, 1965), and cryptochlorophaeic acid.

**DISTRIBUTION.**—Southern United States, Mexico, Central America, West Indies, Venezuela, and Brazil.

**HABITAT.**—On trees (cashew, Xylopia, bamboo, etc.) in mature forests at sea level to 500 m elevation.

**REMARKS.**—The most unusual feature of this New World species is the chemistry, the only reported occurrence of cryptochlorophaeic acid in the Parmeliaceae. The capitate soralia are also unique. The white reticulation is similar to that in the Parmelia texana group, with which it is obviously closely allied.

**CHEMISTRY.**—Cortex K +, medulla K –, C –, KC + red, P –, usnic acid, caperatic acid and lecanoric acid.


**DISTRIBUTION.**—Sri Lanka.

**HABITAT.**—On trees in lowland forest.

**REMARKS.**—Superficially this lichen resembles *P. malaccensis* (Nylander) Hale very closely, but the rhizines are denser and longer, the lobes thicker and dull without alboreticulate patterning, and the chemical components different. It is, however, clearly a member of the *P. intertexta-P. malaccensis* lowland rain forest complex. Another closely related species, *P. rakengensis* (Vainio) Hale, which occurs in the higher elevation monsoon forest in Thailand, is also externally very close. Chemical tests are needed to identify the species. I wish to thank Dr. Hildur Krog for allowing me to see the specimens and to describe them.


**Pseudoparmelia cyphellata**

**Figure 10d**


*Parmelia cyphellata* (Lyng) Santesson, 1942:473.

**DESCRIPTION.**—Thallus as in *P. sphaerospora* (see below) except the upper surface isidiate, isidia cylindrical, rather sparse, up to 1 mm tall. Apothecia abundant, adnate to substipitate, 2–3 mm in diameter; spores 8, about 5 \times 7 \mu m.

**CHEMISTRY.**—Cortex K + yellowish, medulla yellowish to orange with color reagents; atranorin, stictic acid, and an unidentified pigment.

**DISTRIBUTION.**—Brazil.

**HABITAT.**—On trunks of trees in forest.

**REMARKS.**—This species is clearly the isidiate morph of *P. sphaerospora* (Nylander) Hale. Unfortunately it is still known only from the type locality.

**Pseudoparmelia dahlii,** new species

**Figure 10e**

Thallus adnatus, corticola, viridi-flavicans, 3–4 cm latus, lobis sublinearibus, contiguis, 1.5–2.0 mm latis; superne convexus, opacus, dense isidiatus, isidiis cylindricis, simplicibus, usque ad 0.5 mm altis; cortex superior 12–14 \mu m crassus, epicorticus; stratum gonidiale 15–20 \mu m crassum; medulla alba, 140–160 \mu m crassa; cortex inferior paraplectenchymatus, 12–14 \mu m crassus; subitus pallide castaneus, dense rhizinosus, rhizinis pallidis, simplicibus, elongatis. Apothecia adnata, 1 mm diametro; hymenium 40–45 \mu m altum; sporeae 8:nae, 6 \times 7–9 \mu m.

**CHEMISTRY.**—Cortex K +, medulla K –, C –, KC + red, P –, usnic acid, caperatic acid and lecanoric acid.


**DISTRIBUTION.**—Sri Lanka.

**HABITAT.**—On trees in lowland forest.

**REMARKS.**—Superficially this lichen resembles *P. malaccensis* (Nylander) Hale very closely, but the rhizines are denser and longer, the lobes thicker and dull without alboreticulate patterning, and the chemical components different. It is, however, clearly a member of the *P. intertexta-P. malaccensis* lowland rain forest complex. Another closely related species, *P. rakengensis* (Vainio) Hale, which occurs in the higher elevation monsoon forest in Thailand, is also externally very close. Chemical tests are needed to identify the species. I wish to thank Dr. Hildur Krog for allowing me to see the specimens and to describe them.


**Pseudoparmelia ecaperata**

**Figure 10f**


Parmelia malaccensis var. laetepavensis Vainio, 1921:38 [type-collection: Doi Sutep, Thailand, Hosseus, 1904 (TUR, Vainio herbarium number 2764, lectotype)].

Parmelia laetepavensis (Vainio) Gyelnik, 1988a:32.

Parmelia djalonensis des Abbayes, 1951:966 [type collection: Fuuta-Djalon, Dalaba, Guinea, des Abbayes (REN, lectotype)].

DESCRIPTION.—Thallus as in P. concrecens (see above) except yellowish green. Apothecia rare, 1-4 mm in diameter, the amphithecium isidiate; spores 8, 6 x 11-14 μm.

CHEMISTRY.—Cortex K-, medulla K-, C-, KC+ faint wine red, P-; atranorin, divaricatic acid, and usnic acid, rarely with protolichesterinic acid.


HABITAT.—On trees or more rarely rocks in open forest up to 2000 m elevation.

REMARKS.—This species represents the isidiate morph of P. zambiensis (Hale) Hale. It also represents the usnic acid-containing counterpart of P. concrecens, a species which does not occur outside of Africa. It has no relationship to P. caperata, as the name might be construed to imply, which contains protocetraric acid.


Pseudoparmelia eruptens

Pseudoparmelia eruptens (Kurokawa) Hale, 1974:190.


DESCRIPTION.—Thallus adnate, corticolous, whitish mineral gray to buff in the herbarium, 5-8 cm broad; lobes subirregular, rotund, 2-8 mm wide; upper surface plane, continuous, moderately isidiate-pustulate, the isidia irregularly inflated, basally constricted, bursting apically; lower surface black, sparsely rhizinate except for a narrow naked zone at the tips. Apothecia rare, adnate, 1-3 mm in diameter, the amphithecium coarsely isidiate; spores 8, 5-7 x 19-12 μm.

CHEMISTRY.—Cortex K+ yellow, medulla K-, C-, KC- or KC+ purple violet, P-; atranorin and divaricatic acid with associated unknowns.

DISTRIBUTION.—Moçambique and Union of South Africa.

HABITAT.—On trees (and rocks?) in open forest.

REMARKS.—This rare species is probably most closely related to sorediate P. texana (Tuckerman) Hale. The large pustules of P. eruptens do not become sorediate.

SPECIMENS EXAMINED.—Moçambique: Mitchell 332 (US), Union of South Africa: Transvaal, Maas Geesteranus 6455 (L, US), 6455 (L).
Figure 11.—Species of Pseudoparmelia: a, *P. epileuca* (Schelpe 4461b, isotype in BOL); b, *P. eruptens* (Almborn 7498, holotype in LD); c, *P. exornata* (Lamb 1101 in US); d, *P. ferax* (Rogers 1326 in US); e, *P. geesterani* (Maas Geesteranus 6405, holotype in L); f, *P. gerlachei* (Santesson 6495 in US). (Scale in mm.)
**Pseudoparmelia exornata**, new combination

**Figure 11c**


**DESCRIPTION.**—Thallus adnate to closely adnate on bark, yellowish green, 4–10 cm broad; lobes subirregular, contiguous, apically subrotund, 2–4 mm wide, sometimes marginally dissected, becoming lobulate and crowded toward the center, with numerous pycnidia; lower surface black and sparsely rhizinate but with a rugose bare brown zone at the margin near the tips. Apothecia common, adnate nate; spores 8, 8–10 μm in diameter; the rim cre-nate; spores 8, 8–10 × 15–18 μm.

**CHEMISTRY.**—Cortex *K* −, medulla *K* −, *C* −, *KC* − or *KC* + rose, *P* + orange; usnic acid, protocetraric acid, and the "conformata" unknown.

**DISTRIBUTION.**—Southeastern Brazil and Uruguay.

**HABITAT.**—On branches and trunks of shrubs and trees in arid habitats up to 1200 m elevation.

**REMARKS.**—This species is closely related to *P. rutidota* in chemistry and morphology. It produces “conformata” unknown as just below protocetraric acid in the hexane solvent, the same chemistry known for its presumptive isidiate morph, the saxicolous *P. papillosa*. The lobes tend to be thinner and more filiform and finely lacinate than typical *P. rutidota*. It occupies a restricted range in Brazil and Uruguay, whereas *P. rutidota* occurs sporadically in the Andean chain and in northern Brazil, as well as in North America and Australia.


**Pseudoparmelia ferax**

**Figure 11d**


*Parmelia obversa* Stirton, 1899:76 [type collection: Australia, *Palon* (GLAM, lectotype; BM, isolectotype)].

**DESCRIPTION.**—Thallus closely adnate on bark, greenish yellow, 5–8 cm broad; lobes subirregular, crowded, apically rotund, 3–4 mm wide; upper surface soon wrinkled and rugose, in part warty and lobulate; lower surface black and coarsely rhizinate except for a narrow brown zone at the margins. Apothecia common, sessile, plane to almost urceolate, 2–4 mm in diameter; spores 8, 7–8 × 13–16 μm.

**CHEMISTRY.**—Cortex *K* + yellow, medulla *K* −, *C* −, *KC* −, *P* + red; atranorin, usnic acid, and physodalic acid.

**DISTRIBUTION.**—Australia and Chile.

**HABITAT.**—On branches and trunks of shrubs and trees at 1500–1800 m elevation.

**REMARKS.**—This species was almost always identified as “*Parmelia rutidota*” until the chemistry was clarified by Kurokawa (1967). *Pseudoparmelia rutidota* contains protocetraric acid and generally has a more expanded thallus. While described from Australia, *P. ferax* seems to be most common in Chile.


**Pseudoparmelia geesterani**

**Figure 11e**


**DESCRIPTION.**—Thallus closely adnate on rock, dark olive greenish to whitish, 2–4 cm broad; lobes sublinear, crowded, 0.5–1.0 mm wide; upper surface plane, isidiate, isidia coarse and irregularly inflated; lower surface brown or blackening, sparsely rhizinate. Apothecia unknown.

**CHEMISTRY.**—Cortex *K* + yellow, medulla *K* + yellow turning red, *C* −, *KC* −, *P* + orange; atranorin, usnic acid, and salazinic acid.

**DISTRIBUTION.**—Union of South Africa.

**HABITAT.**—On exposed rocks at 1500–1800 m elevation.

**REMARKS.**—This lichen is still known only from...
the type collection. It is not closely related to any other Pseudoparmelia although it might be confused with isidiate-pustulate P. owariensis (Asahina) Hale or P. imperfecta (Kurokawa) Hale.

**Pseudoparmelia gerlachei**

*Figure 11f*

Parmelia gerlachei Zahlbruckner, 1929:137 [type collection: based on Parmelia antarctica Vainio].

Parcetria antarctica Vainio, 1903:13 [type collection: Cap van Beneden, Terre de Dano, Gerlache 326 (TUR, Vainio herbarium number 2839, lectotype); not P. antarctica Bitter. 1901:248 (= Hypogymnia)].

**Xanthoparmelia gerlachei** (Zahlbruckner) Hale, 1974:487.

**DESCRIPTION.**—Thallus closely adnate on rock, rather coriaceous, pale greenish yellow, 3-5 cm broad; lobes subirregular, crowded, apically rotund, 2-4 mm wide; upper surface dull, sometimes lightly pruinose, broadly rugose or foveolate, appearing somewhat inflated, soredia developing in orbicular to irregular laminal, capitulate soralia 2-4 mm in diameter; lower surface black and moderately rhizinate, papillate in a narrow brown marginal zone. Apothecia not found.

**CHEMISTRY.**—Cortex K-, medulla K-, C-, KC-, P+ red; usnic acid and either physodalic acid or protocetraric acid or a mixture of both.

**DISTRICT.**—Andean mountain chain and Argentina.

**HABITAT.**—On rocks in exposed paramo or tundra at 2900-3800 m in the Andes and to sea level in Antarctica.

**REMARKS.**—I had previously considered this to be a Xanthoparmelia because of the saxicolous habitat and presence of usnic acid. The apically rotund lobe configuration and penicillate rhizines and papillae at the margin, as well as physodalic acid, are more characteristic of Pseudoparmelia, as suggested by Kurokawa (1967). Pseudoparmelia gerlachei has evolved in extremely harsh environments where trees are completely absent. The most closely related species and the probable progenitor is P. ferax (Müller Argoviensis) Hale, which occurs on trees in Australia and Chile. Both species contain physodalic acid in the “typical” state, but *P. gerlachei* in Venezuela contains only protocetraric acid whereas Chilean and Argentinian specimens produce both acids. This combination is similar to that in Hypotrachyna physodatalca (Hale) Hale (Hale, 1975a).


**Pseudoparmelia hypomilta**

*Figure 12a*

Pseudoparmelia hypomilta (Fée) Hale, 1974:190.

Parcegia hypomilta Fée, 1837:123 [type collection: Peru (G, lectotype; H, isotype; BM, Mich, isotypes)].

**Parmelia regnellii** Lyng, 1914:40 [type collection: São João d’el Rey, Minas Gerais, Brazil, Malme 208 (S, lectotype; BM, Mich, isotypes)].

**Parmelia regnellii f. arida** Lyng, 1914:141 [type collection: Bocca da Serra, Mato Grosso, Brazil, Malme 2240 (S, lectotype; UPS, US, isotypes)].

**DESCRIPTION.**—Thallus closely adnate on bark, rather coriaceous, buff to straw colored, 1-3 cm broad; lobes sublinear 1.0-1.5 mm wide, often black rimmed; upper surface plane to convex, densely white maculate; medulla white in upper half, dull red in the lower half; lower surface brown, moderately rhizinate, the rhizines brown. Apothecia (description from Malme 171) common, adnate, 1-2 mm in diameter; spores 8, more or less uniseriate, 5 × 6 μm.

**CHEMISTRY.**—Cortex K+ yellowish, medulla K+, C+, KC+ yellowish (pigment K+ purple), P−; atranorin and unidentified substances.

**DISTRICT.**—Brazil.

**HABITAT.**—On trees and rocks in open forests.

**REMARKS.**—Pseudoparmelia hypomilta is a variable species in terms of lobe width. Lyng’s f. arida has quite narrow lobes (1 mm or less) but the types of *P. hypomilta* and *Parmelia regnellii* are comparable in size. While it is difficult to generalize on a species so poorly represented in herbaria, it seems closely related to *P. congruens* but is readily differentiated by the medullary pigment and, as far as we can determine, common occurrence on rock.

**SPECIMENS EXAMINED.**—Brazil: Minas Gerais, Gardner (BM), Malme 171 (LD, UC, US), Warming 302 (M); Mato Grosso, Malme 2240 (US), Malme in *Lichenes Austroamericanus* 92 (G, LD, S, UPS).

**Pseudoparmelia inhaminensis**

*Figure 12b*

Pseudoparmelia inhaminensis (Dodge) Hale, 1974:190.

FIGURE 12.—Species of Pseudoparmelia: a, P. hypomilta (Malme 2745B in US); b, P. inhaminens (Degelius in US); c, P. inornata (Imshaug 24454, isotype in US); d, P. intertexta (Pentype, lectotype of P. gracilis Müller Argoviensis in G); e, P. ischnoides (Almborn 1698, holotype in LD); f, P. labrosa (James 577 in US). (Scale in mm.)
DESCRIPTION.—Thallus adnate on twigs, soft and fragile, buff mineral gray, 3–5 cm broad; lobes subirregular, apically rotund, 1.5–2 mm wide; upper surface more or less regularly rugose and wrinkled, the cortex easily breaking away, heavily pycnidiate; lower surface black and moderately rhizinate except for a narrow brown, bare zone at the tips. Apothecia substipitate, 2 mm in diameter; spores 8, 5–8 × 10–12 μm.

CHEMISTRY.—Cortex K+ yellow, medulla K+ yellow, C−, KC−, P+ orange; atranorin, stictic acid, and constictic acid.

REMARKS.—The chemical constituents and rugose upper surface place *P. inhaminensis* close to *P. crozalsiana* (Bouly de Lesdain) Hale, which is sorediate, and *P. scrobiculata* (Krempelhuber) Hale, which is nonsorediate and has a pruinose apothecial disc, a smaller, very rugose thallus, and unusually large conidiospores (about 20 μm long). The conidiospores of *P. inhaminensis* are about 12 μm long. It is a possible candidate as nonsorediate progenitor of *P. crozalsiana*.

SPECIMENS EXAMINED.—Hawaii: Molokai, Degelius herbarium, US.

**Pseudoparmelia inornata**

**FIGURE 12c**

*Pseudoparmelia inornata* (Hale) Hale, 1974:190.

*Parmelia inornata* Hale, 1971a:32 [type collection: Grand Cayman, Imshaug 24454 (MSC, holotype; US, isotype)].

**DESCRIPTION.**—Thallus closely adnate, corticolous, marginal yellow, 3–10 cm in diameter; lobes sublinear-elongate, 0.5–2 mm wide; upper surface more or less convex, faintly maculate; lower surface pale brown to tan, densely rhizinate, the rhizines simple to densely branched, pale. Apothecia numerous, adnate, 0.7–2 mm in diameter; spores 8, 3–5 × 5–7 μm.

**CHEMISTRY.**—Cortex K+ yellowish, medulla K−, C−, KC+ rose, P+ orange red; atranorin, protocteric acid, protolichsterinic acid, and usnic acid.

**DISTRIBUTION.**—Andaman Islands, Thailand, Malaysia, Philippines, Indonesia, New Guinea, and Australia.

**HABITAT.**—On canopy branches of trees (dipterocarps and *Quercus*) in rain forest at 150–1600 m elevation.

**REMARKS.**—This is one of two *Pseudoparmeliae* (the other being *P. malaccensis* (Nylander) Hale) that have evolved in the Southeast Asian rain forests, primarily on dipterocarps. The only other common Parmelioid genus there is *Relicina* (Hale, 1975b), which is also characterized by a closely adnate habit and presence of usnic acid. *Pseudoparmelia inornata* is a presumptive nonsorediate progenitor of *P. malaccensis* (Nylander) Hale (see...
discussion under that species), although it is anomalous in having branched rhizines.


**Pseudoparmelia ischnoides**

_Pseudoparmelia ischnoides_ (Kurokawa) Hale, 1974:190.


**Description.**—Thallus closely adnate on rock, fragile, whitish ashy gray, 4–10 cm in diameter; lobes sublinear-elongate, 0.5–2 mm wide; upper surface plane to convex, continuous, isidiate, the isidia short, simple, darkening at the tips; lower surface black, sparsely rhizinate. Apothecia adnate, 1–2 mm in diameter, the amphithecium isidiate; spores 8, 5–6 × 7–8 μm.

**Chemistry.**—Cortex _K_+ yellow, medulla _K_−, _C_−, _KC_−, _P_+ pale orange; atranorin, stictic acid, and constictic acid.

**Distribution.**—Union of South Africa.

**Habitat.**—On rocks in open areas.

**Remarks.**—This species has a very limited range in South Africa and probably represents a typical Cape endemic. It bears a superficial resemblance to two other small saxicolous species, _P. annexa_ (Kurokawa) Hale (lecanoric acid present) and _P. arcana_ (Kurokawa) Hale (fatty acids, pale below).

**Specimens Examined.**—See Hale and Kurokawa (1964:156) for records in the Union of South Africa.

**Pseudoparmelia labrosa**


_Parmelia tenuirima_ var. _labrosa_ Zahlbruckner, 1941:108 [type collection: Saddle Hill, Dunedin, New Zealand, Thomson V34 (W, lectotype)].

**Description.**—Thallus adnate on bark, light buff mineral gray, 4–8 cm broad; lobes subirregular, apically subrotund, 1.5–3 mm wide; upper surface plane to rugulose, shiny, sorediate, the soralia originating from coarse pustular ridges, becoming irregular to diffuse; lower surface black and moderately rhizinate. Apothecia adnate, 3–5 mm in diameter; the rim sorediate; spores 8, 5 × 10–12 μm.

**Chemistry.**—Cortex _K_+ yellow, medulla _K_−, _C_+, _KC_+ red, _P_−; atranorin and lecanoric acid.

**Distribution.**—Australia, New Zealand, and Chile.

**Habitat.**—On trees (Drachophyllum, Myrsine, Hymenanthera, and Betula) in open woods at low elevations.

**Remarks.**—The lobe configuration places this austral species near _P. texana_ (Tuckerman) Hale, but the soralia are more diffuse and the chemistry is distinct. The parallel isidiate morph is probably _P. conlabrosa_ Hale; there seems to be no fertile progenitor. The syntype of _P. tenuirima_ var. _labrosa_ (Thomson 2A 683 in W) is _Parmotrema reticulatum_ (Taylor) Choisy.

**Specimens Examined.**—Chile: Chiloe, Santesson 2262 (s). Other records from Australia and New Zealand are listed in Hale (1968:325).

**Pseudoparmelia lecanoracea**


_Parmelia lecanoracea_ Müller Argoviensis, 1888:529 [type collection: Arisdrift, Oranje River, Namaqualand, Union of South Africa, Schenck 543 (G, lectotype)].

**Description.**—Thallus closely adnate, appearing areolate at the center, pruinose whitish buff, 2–3 cm broad; lobes sublinear, 0.6–1.0 mm wide, black rimmed; upper surface convex, rugose with age, roughened; medulla pigmented reddish yellow in the lower half; lower surface tan or darkening, moderately rhizinate, the rhizines brown. Apothecia rare, adnate, 1 mm in diameter; spores 8, 7 × 8–10 μm.

**Chemistry.**—Cortex _K_+ yellow, medulla _K_−, _C_+, _KC_+ rose; atranorin and evenic acid; pigmented medulla _K_+ purple, skyrin present.

**Distribution.**—Union of South Africa.

**Habitat.**—On rocks.

**Remarks.**—This species is still only known from the rather fragmentary type collection. As Müller noted, it could be confused with a _Lecanora_. The
Figure 13.—Species of *Pseudoparmelia*: a, *P. lecanoracea* (Schenck 543, lectotype in G); b, *P. leucoxantha* (Eiten 4497A in US); c, *P. malaccensis* (Hale 24859); d, *P. martinicana* (Hale 35662); e, *P. molybdiza* (Degelius SA-39 in US); f, *P. nairobiensis* (Swinscow 6/1970 n US). (Scale in mm.)
chemistry is anomalous for the genus. It is included here in the hope that future workers will be in a better position to assess its exact relationship.

**Pseudoparmelia leucoxantha**


*Parmelia leucoxantha* Müller Argoviensis, 1881:85 [type collection: Brazil, São Paulo, Puiggari 1050 (G, lectotype; W, isolectotype)].

**DESCRIPTION.**—Thallus adnate to loosely attached on rock or bark, dull greenish yellow, 3–6 cm broad; lobes subirregular, apically rotund, 3–5 mm wide; upper surface plane, rimose with age, sorediate along the margins and in part on the surface, soralia irregular in capitate or elongate masses, the soredia coarse; lower surface black and sparsely rhizinate except for a brown, bare or papillate zone along the margins. Apothecia rare, sessile, up to 2 mm in diameter, the amphithecium sorediate; spores not developed.

**CHEMISTRY.**—Cortex K+ yellowish, medulla K−, C−, KC+ rose, P+ red; atranorin (trace), usnic acid, and protocetraric acid.

**DISTRIBUTION.**—Mexico and Brazil.

**HABITAT.**—On sandstone boulders, more rarely on trees, in dry scrubby areas (chapada vegetation in Brazil) at 300–1100 m elevation.

**REMARKS.**—There is considerable resemblance to *Pseudoparmelia caperata* (L.) Hale in lobe configuration, but the soralia are more discrete and distinctly marginal and lateral. It may well have evolved from nonsorediate *P. rutidota* (Hooker and Taylor) Hale but differs in substratum.


**Parmelia malaccensis**


**DESCRIPTION.**—Thallus adnate, 3–9 cm broad, pale tan mineral gray; lobes sublinear, apically rotund, 2–5 mm wide; upper surface becoming rugose toward the center, densely isidiate, isidia initially papillate, cylindrical to irregularly thickened, simple or branched, rarely turning granular at the tips; lower surface black and sparsely rhizinate at the center, rugose, brown, and naked in a narrow zone at the margin. Apothecia not seen.
**Pseudoparmelia molybdiza**

**Figure 13e**


_Parmelia molybdiza_ Nylander in Coppins, 1876a:19 [type collection: Table Mountain, Cape of Good Hope, Union of South Africa, Eaton (BM, lectotype; H, Nylander herbarium number 35294, isotype)].

_Parmelia atrichoides_ Nylander in Coppins, 1876b:167 [type collection: Cape of Good Hope, Union of South Africa, Eaton (BM, lectotype; H, isotype)].

_Parmelia brachyphylla_ Muller Argoviensis, 1886:256 [type collection: Near Lydenburg, Transvaal, Union of South Africa, Wilms 2752 (BM, lectotype)].

_Parmelia perfissa_ Steiner and Zahlbruckner, 1926:519 [type collection: Port Elizabeth, Cape Province, Union of South Africa, Brunnthalae (W, lectotype; WU, isolectotype)].

**Description.**—Thallus adnate to appressed on rock, whitish mineral gray, 4–8 cm broad; lobes subirregular, apically rotund, crowded toward the thallus center, 2–3 mm wide; upper surface plane, rimose with age; lower surface dark brown and blackening, moderately rhizinate. Apothecia numerous, adnate, 1–2.5 mm in diameter; spores 8, 5 × 6 μm.

**Chemistry.**—Cortex K+ yellowish, medulla K–, C+, KC+ rose, P+ orange red; atranorin, gyrophoric acid, and protocetraric acid (rarely with norlobaridone).

**Distribution.**—Southeastern United States, Mexico, West Indies, and Venezuela.

**Habitat.**—On rocks in open or partly shaded habitats from sea level to about 1200 m elevation.

**Remarks.**—_Pseudoparmelia molybdiza_ is especially common in Cape Province. The isidiate morph appears to be _P. annexa_ (Kurokawa) Hale. The brilliant C+ red test identifies it immediately. _Pseudoparmelia spadochora_ (Kurokawa and Filson) Hale, _P. tortula_ (Kurokawa) Hale, and even _P. vanderbyllii_ (Zahlbruckner) Hale are very similar externally and occur in the same localities where _P. molybdiza_ is found. They would be differentiated by a negative C test.

**Specimens Examined.**—Uganda: Pian County, Swinsscow 2U 81/19A (BM, US), Union of South Africa: Natal, _A. born 8645_, Hoeg (TRH); Transvaal, _M. Geesteranus_ (L); Basutoland, Kofter (LD); Orange Free State, _A. born 5818_, 5831, 5895 (LD); Cape Province, _A. born 1803_, 2065, 2066, 2067, 4837, 4948, 4980, 5690, 11115 (LD), _Degelius SA-59_ (US), _Hoeg_ (LD, TRH), _M. Geesteranus_ 6706, 6707, 6730 (L).

**Pseudoparmelia nairobiensis**

**Figure 13f**

_Pseudoparmelia nairobiensis_ (Steiner and Zahlbruckner) Hale, 1974:190.

_Parmelia nairobiensis_ ("neirobiensis") Steiner and Zahlbruckner, 1926:317 [type collection: Nairobi, Kenya, Schroeder 287 (W, lectotype)].

_Parmelia gracileicenis_ var. _angolensis_ Vainio in Welwitsch, 1901:401 [type collection: Serra da Xella, Huila, Angola, _Welwitsch_ 50 pro parte (TRH, Vainio herbarium number 3059, lectotype)]


_Parmelia ganguellensis_ Dodge, 1959:109 [type collection: Ganguelas and Ambuelas, Benguela, Angola, Gosweiler (BM, lectotype)].
**Parnelia hansfordii** Dodge, 1959:127 [type collection: Kampala, Uganda, Hansford 1455 (BM, lectotype)].

**DESCRIPTION.**—Thallus loosely adnate to appressed on bark, rather coriaceous, greenish to buff mineral gray, 5–10 cm broad; lobes sublinear to subirregular, usually apically subrotund, 2–5 mm wide, often becoming marginally lobulate with age; upper surface plane, shiny, usually conspicuously pycnidiate, reticulately rimose with age; lower surface black except for a narrow marginal brown zone, sparsely to moderately rhizinate. Apothecia common, adnate, 2–5 mm in diameter; spores 8, 6–8 × 8–13 µm.

**CHEMISTRY.**—Cortex K+ yellow, medulla K—, C—, KC+ faint violet or KC—, P—; atranorin and divaricatic acid with associated unknowns.

**DISTRIBUTION.**—Kenya, Uganda, Angola, Zaire, Rhodesia, and Tanzania.

**HABITAT.**—On trees and rocks in open or secondary forest at 1000–1700 m elevation.

**REMARKS.**—This is one of the more common foliose lichens in central Africa. It appears to be (or at least would be similar to) the progenitor for isidiate *P. concrescens* (Vainio) Hale and sorediate *P. texana* (Tuckerman) Hale.


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**Pseudoparmelia neoquintaria**, new species

**FIGURE 14a**

**DESCRIPTION.**—Thallus laxely adnate, saxicola, cinereo-albidus, 3–7 cm latus, lobis sublinearibus, 1–2 mm latis, margine laciniatis; superne planus, continuus vel aetate rimosus, isidiatus, isidiis cylindricis, simplicibus vel ramosis, usque ad 0.5 mm altis; cortex superior 10–15 µm crassum, epicorticate, epicortice perforato, stratum goniendale 10–15 µm crassum, medulla alba, ca 200 µm crassa, cortex inferior paraplectenchymatus, 10–12 µm crassus; subtus castaneus, modice rhizinosus, rhizinis elongatis, simplicibus, castaneis. Apothecia ignota.

**CHEMISTRY.**—Cortex K+ yellow, medulla K— or K+ reddish, C—, KC—, P—; atranorin and the “quintaria” unknowns.

**HOLOTYPE.**—Australia: New South Wales, Mount Wilson, Blue Mountains, *G.E G. Du Rietz* 781, 12 November 1926 (UPS; US, isotype).

**DISTRIBUTION.**—Australia.

**HABITAT.**—On exposed sandstone rocks.

**REMARKS.**—The thallus of this unique species is rather loosely attached with a tendency for the lobes to become revolute, a kind of growth form often seen with soil-inhabiting *Xanthoparmeliae* growing under harsh conditions. The “quintaria” unknowns have been discovered in the brown *Parmeliae* and in *Xanthoparmelia quintaria* (Hale) Hale, which has quite different lobe configuration and a black lower surface.

**Pseudoparmelia owariensis**

**FIGURE 14b**

**Pseudoparmelia owariensis** (Asahina) Hale, 1974:190.

**Parmelia owariensis** Asahina, 1953:135 [type collection: Inuyama, Province Owari, Japan, Asahina (TNS, lectotype)].

**DESCRIPTION.**—Thallus closely adnate on rocks, whitish mineral gray, 2–5 cm broad; lobes sublinear, 0.5–2 mm wide; upper surface plane, continuous or cracked with age, isidiate-pustulate, the isidia coarse, short, cylindrical to irregularly inflated, bursting open apically; lower surface black, sparsely rhizinate. Apothecia unknown.

**CHEMISTRY.**—Cortex K+ yellow, medulla K—, C—, KC+ faint purple violet, P—; atranorin, and divaricatic acid with associated unknowns.

**DISTRIBUTION.**—Africa, Thailand, Hong Kong, and Japan.

**HABITAT.**—On rocks in open areas at lower elevations.

**REMARKS.**—*Pseudoparmelia owariensis* is a member of a saxicolous pustulate complex that also includes *P. pustulescens*. These two species cannot be distinguished except by chemical tests. Many more specimens will have to be examined to comprehend more fully their relationships.

FIGURE 14.—Species of *Pseudoparmelia*: a, *P. neoquintaria* (Du Rietz 781, holotype in US); b, *P. owariensis* (Kurokawa 1874 in US); c, *P. pachydactyla* (Köfler in US); d, *P. papillosa* (Zorrón 2334 in US); e, *P. prolata* (Hoeg, holotype in TRH); f, *P. pustulescens* (Santesson 10691b in US). (Scale in mm.)
**Pseudoparmelia pachydactyla**

*Figure 14c*


*Parmelia caperata* var. *isidiophora* Steiner, 1897 [type collection: Athi Plains, Kenya, Liechtenstein (WU, lectotype)].

*Parmelia pachydactyla* Hale, 1972b:345 [type collection: based on *P. caperata* var. *isidiophora* Steiner; not *P. steineri* Geyelnik, 1938b:289 (= *Xanthoparmelia molliscula* (Acharius) Hale)].

**DESCRIPTION.**—Thallus closely adnate on rock, light greenish yellow, 4–6 cm broad; lobes sublinear, crowded toward the center of the thallus, 1–1.5 mm wide; upper surface plane, dull, isidiate, the isidia scattered, thick, about 0.3 mm wide and to 0.5 mm high; lower surface black and velvety to the margin, sparsely rhihzinate, the rhizines coarse, dull. Apothecia unknown.

**CHEMISTRY.**—Cortex K− or KC+, medulla K−, C−, KC− or KC+ rose, P+ red; usnic acid and protocetraric acid.

**DISTRIBUTION.**—Kenya and Rhodesia.

**HABITAT.**—On rocks in semiarid regions at mid elevation.

**REMARKS.**—While I had recently transferred this species to *Xanthoparmelia*, partly because of its saxicolous habit, it displays features characteristic of *Pseudoparmelia*: broad, apically rotund lobes, a bare or papillate brown zone at the tips below, rhizines with brown, fibrous tips, and presence of protocetraric acid which is rare in *Xanthoparmelia*, especially in New World species. As so delimited, *P. papillosa* is another offshoot from the *P. rutidota* complex differentiated by the very large almost pustular isidia. A comparable saxicolous species containing protocetraric acid, without the “conformata” unknown, *P. baltimorensis* (Geyelnik and Föriss) Hale, has even larger more typically pustular outgrowths.


**Pseudoparmelia papillosa**, new combination

*Figure 14d*

*Parmelia papillosa* Lyghe ex Geyelnik, 1939:43 [type collection: Canelones, La Paz, Uruguay, F. Felippone 752 (W, lectotype)].


**DESCRIPTION.**—Thallus adnate on rock, greenish yellow, 4–6 cm broad; lobes subirregular, apically rotund, 2–4 mm wide; upper surface plane and shiny, somewhat white-reticulate at the tips, becoming rugose and densely isidiate toward the center, the isidia irregularly inflated, to 0.4 mm thick and up to 1 mm high, solid but the tips easily eroding away, not becoming sorediate; lower surface black and moderately rhizinate except for a bare or papillate zone at the tips. Apothecia common, substipitate and often appearing immersed among the isidia, 1.5–3 mm in diameter, the amphithecium and rim densely isidiate; spores 8, 7–8 × 16–18 μm.

**CHEMISTRY.**—Cortex K−, medulla K−, C−, KC−, or KC+ reddish, P+ red; usnic acid, protocetraric acid, and the “conformata” unknown.

**DISTRIBUTION.**—Brazil, Uruguay, and Argentina.

**HABITAT.**—On acidic rocks in open areas from sea level to 1000 m elevation.

**REMARKS.**—While I had recently transferred this species to *Xanthoparmelia*, partly because of its saxicolous habit, it displays features characteristic of *Pseudoparmelia*: broad, apically rotund lobes, a bare or papillate brown zone at the tips below, rhizines with brown, fibrous tips, and presence of protocetraric acid which is rare in *Xanthoparmelia*, especially in New World species. As so delimited, *P. papillosa* is another offshoot from the *P. rutidota* complex differentiated by the very large almost pustular isidia. A comparable saxicolous species containing protocetraric acid, without the “conformata” unknown, *P. baltimorensis* (Geyelnik and Föriss) Hale, has even larger more typically pustular outgrowths.


**Pseudoparmelia prolata**

*Figure 14e*


*Parmelia prolata* Hale, 1972:344 [type collection: Cape Province, Union of South Africa, Höeg (TRH, holotype; LD, US, isotypes)].

**DESCRIPTION.**—Thallus adnate to loosely attached on rock or rarely on soil, pale olivaceous mineral gray, 4–7 cm broad; lobes sublinear, extended, almost divaricate, 2–3 mm wide; upper surface plane, shiny; lower surface pale brown, moderately rhizinate, the rhizines pale brown. Apothecia not seen.

**CHEMISTRY.**—Cortex K+ yellow, medulla negative with all reagents; atranorin and an unknown spot (aliphatic compound?).
**Pseudoparmelia pustulescens**

*Figure 14f*


**DESCRIPTION.**—Thallus as in *P. owariensis* (see above). Apothecia adnate, 1–2 mm in diameter, the amphithectium pustulate; spores 8, 4–5 × 7–9 μm.

**CHEMISTRY.**—Medulla *K*−, *C*−, or *C*+ yellow, *KC*−, *P*− or *P*+ faint; barbatic acid, obtusatic acid, 4-0-demethyl-barbatic acid, unidentified substance, rarely with an unidentified pigment.

**DISTRIBUTION.**—Thailand.

**HABITAT.**—On tree bark or rocks in open deciduous forests at 300–1850 m.

**REMARKS.**—This species is unique in producing barbatic acid. Is is superficially similar to two other narrow lobed, usnic acid-containing Asian species, *P. dahlii* Hale (lecanoric acid), and *P. malaccensis* (Nylander) Hale (protocetraric acid). Chemical tests should be made to separate them.

**SPECIMENS EXAMINED.**—Thailand: *Kerr L28, (BM, US), Kurokawa 1602, 1815 (TNS, US).*

**Pseudoparmelia raunkiaeri**

*Figure 15b*

*C. raunkiaeri* Vainio, 1915:19 [type collection: Cane Bay, St. Croix, Raunkiaer 461 (TUR, Vainio herbarium number 2752, lectotype; C, FH, isotypes)].

*Parmelia scabrosa* Vainio, 1896a:33 [type collection: Chateau Belair, St. Vincent, Elliott 249 (TUR, lectotype; BM, islectotype); not *Parmelia scabrosa* Taylor, 1847:162 (= *Xanthoparmelia scabrosa* (Taylor) Hale)].

*Parmelia vincentina* Zahlbruckner, 1929:222 [type collection: based on *Parmelia scabrosa* Vainio].

**DESCRIPTION.**—Thallus closely adnate on bark or rock, yellowish green, 3–6 cm broad; lobes sublinear, 0.5–2 mm wide; upper surface convex, continuous, densely isidiate, the isidia mostly simple, to 0.2 mm high; lower surface brown to tan, moderately rhizinate, the rhizines tan. Apothecia adnate, 1–3 mm in diameter, the amphithecium sparsely isidiate; spores 8, 5 × 5 μm.

**CHEMISTRY.**—Cortex *K*+ yellow, medulla *K*−, *C*−, or *C*+ *KC*+ orange, *P*− or *P*+ faint; barbatic acid, obtusatic acid, 4-0-demethyl-barbatic acid, unidentified substance, rarely with an unidentified pigment.

**DISTRIBUTION.**—Thailand.

**HABITAT.**—On tree bark or rocks in open deciduous forests up to 2000 m elevation.

**REMARKS.**—This species is essentially indistinguishable from *P. owariensis* (Asahina) Hale and a chemical test is needed to separate them. They appear to be sympatric although collected together only in the Ivory Coast. By using thin-layer chromatography I had earlier synonymized *P. imperfecta* (Hale, 1972b).


**Pseudoparmelia rahengensis**

*Figure 15a*

*C. rahengensis* Vainio, 1921:39 [type collection: Nong Boa, near Raheng, Thailand, Hosseus 320 (TUR, lectotype)].

**DESCRIPTION.**—Thallus closely adnate on bark or rock, yellowish green, 3–6 cm broad; lobes sublinear, 0.5–2 mm wide; upper surface convex, continuous, densely isidiate, the isidia mostly simple, to 0.2 mm high; lower surface brown to tan, moderately rhizinate, the rhizines tan. Apothecia adnate, 1–3 mm in diameter, the amphithecium sparsely isidiate; spores 8, 5 × 5 μm.

**CHEMISTRY.**—Cortex *K*+ yellow, medulla *K*−, *C*−, or *C*+ *KC*+ orange, *P*− or *P*+ faint; barbatic acid, obtusatic acid, 4-0-demethyl-barbatic acid, unidentified substance, rarely with an unidentified pigment.

**DISTRIBUTION.**—Thailand.

**HABITAT.**—On rock, more rarely on loose soil, in open areas.

**REMARKS.**—The general configuration of this species is that of a *Xanthoparmelia*. In many respects it resembles *P. neoquintaria* Hale, which occurs in similar habitats in Australia but has a different chemistry. The isidiate morph is *P. basutoensis* (Hale) Hale.

**SPECIMENS EXAMINED.**—See Hale (1972b:344) for records from the Union of South Africa.
FIGURE 15. Species of Pseudoparmelia: a, P. rahengensis (Kurokawa 1602 in US); b, P. raunkiaeri (Evans in US); c, P. rodriguesiana (Santesson 105 60a in US); d, P. rupicola (Reitz and Klein 16113 in US); e, P. rutidota (Heller 260 in US); f, P. salacinifera (Moore 4406 in US). (Scale in mm except for P. rahengensis which is ×3.)
**Pseudoparmelia rodriguesiana**


**DESCRIPTION.**—Thallus closely adnate on rock, whitish mineral gray, 5–10 cm in diameter; lobes sublinear to subirregular, 2–3 mm wide; upper surface plane to rugulose, cracked with age; lower surface black, sparsely rhizinate except for a narrow naked zone near the tips. Apothecia common, sessile, 2–8 mm in diameter; spores 8, 5–7 × 8–13 μm.

**CHEMISTRY.**—Cortex K+ yellow, medulla K-, C-, KC- or KC+ wine colored, P-; atranorin and divaricatic acid with associated unknowns.

**DISTRIBUTION.**—Brazil and Uruguay.

**HABITAT.**—On sandstone outcrops in open areas at about 1000 m elevation.

**REMARKS.**—*Pseudoparmelia rupicola* closely resembles sorediate *P. alabamensis* (Hale and McCullough) Hale in lobe configuration and adnation on sandstone, and they may be remotely related. Strictly saxicolous species of *Pseudoparmelia* are rare in New World.


**Pseudoparmelia rupicola**


**DESCRIPTION.**—Thallus closely adnate on rock, whitish to ivory mineral gray, 4–8 cm broad; lobes sublinear, contiguous, 1–2 mm wide; upper surface plane to rugulose, shiny, transversely rimose with age, becoming lobulate toward the center; lower surface black except for a dark brown zone at the tips, moderately rhizinate, the rhizines black. Apothecia common, adnate, 1–1.5 mm in diameter; spores 8, 6 × 7–8 μm.

**CHEMISTRY.**—Cortex K+ yellow, medulla K-, C-, KC- or KC+ wine colored, P-; atranorin and divaricatic acid with associated unknowns.

**DISTRIBUTION.**—Brazil and Uruguay.

**HABITAT.**—On sandstone outcrops in open areas at about 1000 m elevation.

**REMARKS.**—*Pseudoparmelia rupicola* closely resembles sorediate *P. alabamensis* (Hale and McCullough) Hale in lobe configuration and adnation on sandstone, and they may be remotely related. Strictly saxicolous species of *Pseudoparmelia* are rare in New World.


**Pseudoparmelia rutidota**


*P. rutidota* Hooker and Taylor, 1844:645 [type collection: Van Diemen’s Land, Australia (FH, lectotype)].

*P. caperata* var. *caperatula* Nylander, 1860:377 [type
Parnelia caperata f. ramealis Nylander, 1861:373 [type collection: Andes, Bolivia, Mandon (H, Nylander herbarium number 35692, lectotype; FH, S, isolectotype)].

Parnelia jelinekii Krempelhuber, 1868:321 [type collection: Australia, Jelinek 27 (M, lectotype; W, isolectotype)].

Parnelia ochroleuca Müller Argoviensis, 1882:306 [type collection: Near Illawarra, Australia, Kirton 1 (G, lectotype; not Parnelia ochroleuca Taylor, 1848:24 (= Sticta)].

Parnelia splendidula Delise ex Nylander, 1885:605 [type collection: Peru (H, Nylander herbarium number 35730, lectotype; BM, isolectotype)].

Parnelia caperata (Nylander) Nylander, 1885:606.

Parnelia subcaperata Nylander, 1885:606 [type collection: Derwent River, Tasmania, Brown (H, Nylander herbarium number 35730, lectotype; BM, isolectotype)].

Parnelia confertula Stirton, 1899:77 [type collection: Brisbane, Australia, Bailey (BM, lectotype)].

**DESCRIPTION.**—Thallus adnate to appressed on bark, light greenish yellow, 3–8 cm broad; lobes subirregular, apically rounded, contiguous, 2–4 mm wide; upper surface plane or becoming rugulose and cracked on older lobes; medulla white but sometimes with a reddish pigment near the lower cortex; lower surface black, shiny, sparsely rhizinate, usually with a bare dark brown naked zone at the tips. Apothecia common, sessile, the rim crenate, 1–3 mm in diameter; spores 8, 7–10 × 14–20 μm.

**CHEMISTRY.**—Cortex K− or K+ yellowish, medulla K−, C−, KC− or KC+ rose, P+ red; usnic acid, rarely atranorin, protocetraric acid with or without associated unknowns, and with or without caperatic acid (and protolichesterinic acid?) and unidentified K+ purple pigments.

**DISTRIBUTION.**—United States, Mexico, South America, and Australia.

**HABITAT.**—On trunks and branches of trees in semiarid regions at 100–2000 m elevation.

**REMARKS.**—*Pseudoparmelia rutidota* is a rather variable species, as one might assume from the long list of synonyms. It occurs very commonly in certain semiarid regions, especially Texas in the United States and New South Wales in Australia. Outside of this it is relatively rare. The comparable African populations appear to consist entirely of *P. amplexa* (Stirton) Hale, a smaller, more congested species with a black velvety lower surface. On the other hand, some specimens from Mexico and South America are quite a bit larger than the average. Obviously environmental modification plays a role in this variation. Basically *P. rutidota* could be, or closely resemble, a now extinct progenitor (or progenitors?) of the sorediate morph *P. caperata* (L.) Hale, the pustulate morph *P. baltimorensis* (Gyelnik and Foriss) Hale, and the isidiate morph *P. papillosa* (Gyelnik) Hale. None of these fit their respective roles perfectly but together they form a coherent species group.

Chemical variation centers around the presence or absence of fatty acids, in most cases caperatic acid, and a medullary pigment. There seems to be no geographic pattern here, but assuredly many more field studies and collections are needed to determine this. For the present a rather broad species concept seems unavoidable.


**Pseudoparmelia salacinifera**

**FIGURE 15f**


Parnelia salacinifera Hale in Hale and Kurokawa, 1964:157 [type collection: Sanford, Seminole County, Florida, Rapp (US, holotype; FLAS, isotype)].

**DESCRIPTION.**—Thallus adnate on bark, light ashy buff, 6–12 cm broad; lobes subirregular, apically subrounded, 3–5 mm wide; upper surface plane to rugulose, fissured with age, moderately isidiate, the isidia simple, to 0.3 mm high; lower surface brown to tan, moderately rhizinate except for a narrow naked zone along the margins. Apothecia rare, 2–4 mm in diameter, the amphithecium isidiate; spores 8, 8–9 × 13–16 μm.

**CHEMISTRY.**—Cortex K+ yellow, medulla K+ yellow turning red, C−, KC−, P+ pale orange; atranorin and salazinic acid.

**DISTRIBUTION.**—Southeastern United States, Mexico, Central America, West Indies, Colombia, Venezuela, Brazil, and Thailand.
Habitat.—On trees (deciduous trees, palm, conifers) in open or secondary forest from sea level to 1000 m elevation.

Remarks.—The distinguishing features of this species are the isidia and pale brown lower surface. The only other comparable salazinic acid-containing species is saxicolous \textit{P. scotophylla} Kurokawa from Australia. It has a smaller thallus and small spores. \textit{Pseudoparmelia cinerascens} (Lynge) Hale has a black lower surface. The only other species that could be confused with it because of the similar habitat, range, thallus color, and lobe configuration is \textit{P. amazonica} (Nylander) Hale, which has a black lower surface and contains protocetraric acid (K−).


\textit{Pseudoparmelia schelpei}

\textbf{Figure 16a}


\textit{Parnelia schelpei} Hale, 1972b:344 [type collection: Maxixe, SUL do Sate, Moçambique, Schelpe 4460 (BOL, holotype; ID, US, isotypes)].

Description.—Thallus closely adnate on bark, whitish mineral gray, 2–4 cm broad; lobes sublinear, crowded, 1.5–2.0 mm wide; upper surface plane, dull, rugulose with age; lower surface black, sparsely rhizinate. Apothecia numerous, adnate, 1–2 mm in diameter; spores 8, 4 × 8–10 μm.

Chemistry.—Cortex K+ yellow, medulla K−, C−, KC−, P−; atranorin and protocetraric acid.

Distribution.—Moçambique.

Habitat.—On coconut palms near sea level.

Remarks.—No other species in \textit{Pseudoparmelia} has protocetraric acid and such narrow lobes. \textit{Pseudoparmelia caribaea} (Hale) Hale, a saxicolous species in the West Indies, is much larger. The sorediate morph of \textit{P. schelpei} is presumed to be \textit{P. epileuca} (Hale) Hale, which also occurs in Moçambique as well as in Kenya. I suspect both species will be more frequently collected as lichenologists visit coastal localities in East Africa.

Specimens Examined.—Moçambique: Mogg 2099 (PRE, US).

\textit{Pseudoparmelia schistacea}, new combination

\textit{Parnelia schistacea} Kurokawa and Filson, 1975:44 [type collection: 65.5 km west of Kingoonya, South Australia, Filson 11921 (MEL, holotype) (not seen)].

Description.—Thallus closely adnate, pale olivaceous gray, 2–4 cm broad; lobes sublinear-elongate, crowded at the center of the thallus, 0.5–1.5 mm wide; upper surface plane to convex, shiny, becoming tangentially rimose, pustulate; medulla white; lower surface pale brown, sparsely rhizinate. Apothecia not seen.

Chemistry.—Cortex K+ yellow, medulla K−, C−, KC−, P−; atranorin, a trace of usnic acid, caperatic acid, and an unidentified fatty acid.

Distribution.—Australia.

Habitat.—On rocks in open areas.

Remarks.—The authors of this species compare it with \textit{P. arcana} (Kurokawa) Hale, both having closely adnate, almost subcrustose thalli. They have different morphologies, however, \textit{P. arcana} being typically isidiate. A trace of usnic acid is alleged to occur in \textit{P. schistacea}. The species is illustrated in Kurokawa and Filson (1975, pl. 4: fig. 1).

\textit{Pseudoparmelia scotophylla}, new combination

\textbf{Figure 16b}

\textit{Parnelia scotophylla} Kurokawa in Kurokawa and Filson, 1975:45 [type collection: Ardgen Gap, Liverpool Range, New South Wales, Australia, Kurokawa 5174 (TNS, holotype; MEL, isotype) (not seen)].

Description.—Thallus closely adnate, whitish to dark mineral gray, 4–12 cm broad; lobes sublinear, congested, apically subrotund, 1–2 mm wide; upper surface plane, shiny, becoming densely isidiate, the isidia cylindrical, simple, the tips blackened; lower surface dark brown or blackening, sparsely to moderately rhizinate, the rhizines brown or black, simple. Apothecia (from type description) substipitate, 6 mm in diameter, the amphithecium isidiate; spores 8, 5 × 7–8 μm.

Chemistry.—Cortex K+ yellow, medulla K+, C−, KC−, P+ orange; atranorin and salazinic acid.
Figure 16.—Species of Pseudoparmelia: a, *P. schelpei* (Schelpe 4460, isotype in US); b, *P. scotophylla* (Weber L-47301 in US); c, *P. scrobicularis* (Malme 1949, isotype of *Parmelia longiconida* Lyng in US); d, *P. somaliensis* (Jellicoe 40 in US); e, *P. soredians* (Sampaio 247 in US); f, *P. sphaerospora* (Hale 21970A). (Scale in mm.)
Pseudoparmelia somaliensis

**Figure 16d**


Parmelia somaliensis Müller Argoviensis, 1885:501 [type collection: Somaliland, Hildebrandt (G, lectotype)].

Parmelia scottii Vainio, 1898a:40 [type collection: Ruwenzori, Africa, Scott-Elliott (TUR, Vainio herbarium number 2693, lectotype)].

Parmelia ranulicola Dodge, 1959:172 [type collection: Madagascar, Hildebrandt (FH, holotype)].

**Description.**—Thallus adnate on twigs, whitish mineral gray, rather soft and appearing inflated, 3–5 cm broad; lobes subirregular, 2–5 mm wide; upper surface plane to rugulose, dull, becoming white-pruinose; lower surface dark brown to black and moderately rhizinate except for a brown naked zone along the margins. Apothecia common, substipitate, almost urceolate, 2–5 mm in diameter, the amphithectum rugose, pruinose; spores 8, 5–7 × 9–13 μm.

**Chemistry.**—Cortex K+ yellow, medulla K–, C–, KC+ rose, P+ red; atranorin and protoceptraric acid.

**DISTRIBUTION.**—Central Africa and Madagascar.

**HABITAT.**—On twigs and branches of trees in open areas up to 2300 m elevation.

**Remarks.**—The most characteristic habitat of this species is small twigs. The thallus is thick and soft with large apothecia. There are no close relatives in the genus for this African endemic.


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Pseudoparmelia scrobicularis

**Figure 16c**


Parmelia scrobicularis Krempelhuber, 1873:10 [type collection: Lagoa Santa, Brazil, Warming (M, lectotype)].


**Description.**—Thallus closely adnate on bark, light buff mineral gray, 2–5 cm broad; lobes sublinear, contiguous, 1.0–1.5 mm wide; upper surface finely foveolate, dull to shiny, lower surface black, moderately rhizinate. Apothecia common, adnate, 1.5–2.5 mm in diameter, the disc white pruinose; spores 8, 6–7 × 10–12 μm.

**Chemistry.**—Cortex K+ yellow, medulla K–, C–, KC+ rose, P+ red; atranorin and constictic acid.

**DISTRIBUTION.**—South America.

**HABITAT.**—On trees in open or secondary forest.

**Remarks.**—The reticulate wrinkles are very strongly developed but are not visible without low power magnification. Two possibly related species, P. carneopruinata (Zahlbruckner) Hale, a presumptive sorediate morph, and P. crozalsiana (Bouly de Lesdain) Hale, have broad reticulately ridged lobes.

**SPECIMENS EXAMINED.**—Venezuela: Distrito Federal, Ernst (G). Brazil: Minas Gerais, Henschel (UPS). Paraguay: Malme (UPS); Paraguara, Balansa (G). Argentina: Misiones, Montes 10089 pro parte (LD).
**DESCRIPTION.**—Thallus adnate on branches and trunks of trees, rarely on rocks, yellowish green, 6–15 cm broad; lobes subirregular, apically rotund, 2–5 mm wide; upper surface plane, shiny, becoming rugose toward the center, sorediate, soralia orbicular, coalescing, often occurring along ridges and wrinkles; lower surface black except for a marginal brown zone, sparsely rhizinate, the rhizines black. Apothecia rare, adnate; spores not seen.

**CHEMISTRY.**—Cortex K−, medulla K+ yellow turning red, C−, KC−, P+ orange; usnic acid and salazinic acid.

**DISTRIBUTION.**—Europe, Central and South Africa, Argentina, Chile, and New Zealand.

**HABITAT.**—On trees and rarely on rocks in open forests.

**REMARKS.**—This species is similar to *P. caperata* (L.) Hale except for the discrete, orbicular soralia and different chemistry (*P. caperata* is P+ red with protocetraric acid). It is totally absent from North America and eastern Asia, where *P. caperata* is very common. In England it behaves as a Mediterranean species, occurring mostly in the southeastern parts of the country where rainfall is low and there are no severe frosts (James and Rose, 1973).

**SPECIMENS EXAMINED.**—Europe: Ireland, Mitchell (M); England, Holmes (BM); France, Croulas (US), Dahl (WIS), des Abbayes in *Lichenes Armorici Spectabiles* 13 (LD), Mangillon 668 (US), Santesson 10077 (UPS); Portugal, Persoon (UPS), Sampaio in *Lichenes de Portugal* 247 (LD, M, US), Tavares in *Lichenes Lusitaniae selecti exsiccati* 140 (H, LD, M, US, WIS); Italy, Sbarbaro (US), Sbarbaro in *Lichenes Selecti Exsiccati* 24 (H, LD, M, US, WIS). Kenya: Central Province, Maas Geesteanus (L). Union of South Africa: Transvaal, Almborn 6603, 7501, 7505 (LD), Höeg (TRH); Natal, Almborn 9641, 9763 (LD), Höeg (TRH); Basutoland, Kofler (LD); Cape Province, Almborn 1604, 1997, 1998, 2030, 2099, 2000, 2153, 2121, 4108, 4735, 5361, 10662, 10862 (LD), Höeg (TRH), Kofler (LD), Maas Geesteanus 6623 (L), Penfield 220 (PRE). Argentina: Buenos Aires, Santesson 48 (S); Chubut, Santesson 195 (S). Chile: Santiago, Mauh 1117, 2034 (US); Concepción, Barros 3, 193 (H). New Zealand: Scott 323 (BM).

**Pseudoparmelia sphaerospora, new combination**

*Pseudoparmelia sphaerospora* Nylander, 1859:254 [type collection: Madagascar, (H, lectotype; PC, isotype)].

*Parmelia leucochloa* Tuckerman in Nylander, 1866:392.

*Parmelia cubensis* Nylander, 1885:611.

*Parmelia uleana* Müller Argoviensis, 1889:506.

*Parmelia flavidogaucha* Vainio, 1890:65.

*Parmelia endoxantha* Merrill, 1909:73.

*Parmelia bipindensis* Dodge, 1959:59.

*Parmelia zenkeri* Dodge, 1959:74.

[Full citations of the synonyms are given in Hale (1971b:10).]

**DESCRIPTION.**—Thallus closely adnate on bark, 5–10 cm in diameter, pale greenish or yellowish mineral gray, often turning chamois in the herbarium; lobes sublinear-elongate, 2–4 mm wide; upper surface plane to convex, more or less maculate, rugulose to minutely pitted with age; medulla white to pale yellow; lower surface light tan to pale olive brown or darkening, rugose, moderately rhizinate, the rhizines simple, tan. Apothecia common, adnate, 2–3 mm in diameter; spores 8, 6–8 × 7–9 μm.

**CHEMISTRY.**—Cortex K− or K+ yellowish, medulla yellowish to orange with color reagents; atranorin, stictic acid, norstictic acid, gyrophoric acid, “quintaria” unknowns, and an unidentified yellow pigment in various combinations. The majority of specimens contained atranorin and the pigment; the next largest group (about 20% of the specimens) had atranorin, stictic acid, and the pigment. The other combinations (atranorin with the “quintaria” unknown, with stictic and norstictic acids, or with gyrophoric acid) occurred in only a few specimens.

**DISTRIBUTION.**—Southeastern United States, Mexico, Central America, West Indies, South America, and Central Africa.

**HABITAT.**—On shaded tree trunks in mature forests, Taxodium swamps, or orchards from sea level to 1100 m elevation.

**REMARKS.**—I had previously discussed the occurrence of this species in Dominica under the name *Parmelia congruens* Acharius (Hale, 1971b:11). After making as definitive a summary as possible of the chemistry, however, I discovered that the lectotype of *P. congruens* contains usnic and hypoprotoctraric acids and is better placed in the genus Xanthoparmelia, leaving *P. sphaerospora* as the earliest name for the *Pseudoparmelia* species. The medullary color often darkens in old herbarium specimens. The isidiate morph is *P. cyphellata* Lyngbye.

**SPECIMENS EXAMINED.**—United States: South Carolina, Culberson 1029 (DUKE, US); Georgia, Egan El-9403, El-6744 (US), Hale 16832; Alabama, Evans 98, 201, 345, 371 (US); Mississippi, McDaniel L-3 (US), Pursell 3083, 3153, 4181 (US);

**Pseudoparmelia spodochroa**, new combination

**FIGURE 17a**

Parmelia spodochroa Kurokawa and Filson, 1975:46 [type collection: Warren Gorge, Flinders Range, South Australia, R. Filson 11976 (MEL, holotype; TNS, isotype) (not seen)].

**Description.**—Thallus adnate on rock, whitish to dark mineral gray, 3–6 cm broad; lobes suboblong, apically subrotund, contiguous, becoming lobulate with age, 1.5–2.5 mm wide; upper surface plane, transversely rimoose with age; lower surface brown or blackening, moderately rhizinate; the rhizines brown or black. Apothecia (from Degelius SA–57) adnate, 2–3 mm in diameter; spores 8, 6 × 8–11 μm.

**Chemistry.**—Cortex K+ yellow, medulla K+ yellow turning red, C–, KC–, P+ orange; atra norin, salazinic acid, and usually norstictic acid.

**Distribution.**—Australia and Union of South Africa.

**Habitat.**—On more or less exposed rocks in dry woodlands.

**Remarks.**—This species is represented by only five collections, which diverge rather widely in several characters. The color of the lower surface, for example, varies from almost entirely black to pale brown. Chemistry is uniform except for Almborn 4900 and the holotype, which lack norstictic acid. The lobe surface is smooth and shiny except for Degelius SA–57, which has a roughened, almost coarsely pruinose surface, a trait seen in specimens of other genera that grow in exposed desert regions. Further collecting in Africa and Australia will be needed to decide whether the limits of the species as described here are too broad.


**Pseudoparmelia subambigua**, new species

**FIGURE 17b**

**Description.**—Thallus arcte adnatus, mollis, viridi-flavicans, 5–10 cm latus, lobis subirregularibus, brevis; brevis, apice subrotundatis, congestis, 1.0–3.0 mm latis; superne planus, centrum versus rugo-sus, dense sorediatus, soraliis orbiculosus, con- fluentibus; cortex superior 8–10 μm crassus, epicotex perforatus, stratum gonidiale 20 μm crassum, medulla alba, 110–120 μm crassa, cortex inferior 7–10 μm crassus; subtus niger, sparse rhizinosus, rhizinis simplicibus, nigris. Apothecia ignota.

**Chemistry.**—Cortex K–, medulla K–, C+, KC+ red, P–; usnic acid and lecanorc acid.

**Holotype.**—Chile: Antofagasta, Papos Quebrada Guanillo, elevation 880 m, M. Mahu 3405, 12 September 1972 (US; Mahu herbarium, isotype).

**Distribution.**—Chile.

**Habitat.**—On shrubs and fence posts in open areas from sea level to 900 m elevation.

**Remarks.**—This lichen could easily be misidentified as Parmeliopsis ambiguas (Acharius) Nyland- er. The lower surface is black, however, and the chemistry distinctive. Larger specimens may also resemble Pseudoparmelia soredians (Nylander) Hale, which contains salazinic acid and which may well be the most closely related species. It is known only from Chile.

**Specimens Examined.**—Chile: Coquimbo, Rundel 7230 (US), Santesson 2519 (S, US); Santiago, Rundel 7323 (US); Valparaí-so, Santesson 2808 (S, US).

**Pseudoparmelia subamplexa**, new species

**FIGURE 17c**

**Description.**—Thallus ut in Pseudoparmelia am- plexa (Stirton) Hale sed superficie sorediatus, soraliis
Figure 17.—Species of Pseudoparmelia: a, P. spodochroa (Weber L-47220 in US); b, P. subambigua (Santesson 2519 in US); c, P. subamplexa (Schütte 34k, isotype in US); d, P. subtiliacea (Knight 7, lectotype in H); e, P. subtortula (Lye L202A, holotype in BM); f, P. texana (Hale 42248). (Scale in mm.)
orbicularibus, discretis vel pro parte confluentibus; cortex superior 15–18 μm crassus, epicortatus, epicortice perforato, stratum gonidiale 15–20 μm crassum, medulla alba, 110–130 μm alta, cortex inferior 14–20 μm crassus; subtus niger, opacus, modice rhizinosus, rhizinis simplicibus. Apothecia ignota.

ROSE, P+ red; usnic acid and protocetraric acid.

HOLOTYPE.—on tree, Chishawasha, Salisbury District, S. Rhodesia, K. Schütte 34k, 30 December 1953 (LD; US, isotype).

CHEMISTRY.—Cortex K–, C–, KC– or KC+ DsTRIsuTroN.—Rhodesia.

HABITAT.—on trees in arid scrub land.

REMARKS.—This is the sorediate morph of P. amplexa (Stirton) Hale. It has the same peculiar black velvety lower surface. As with the parent species, it is restricted to Africa.


**Pseudoparmelia subtiliacea**

**FIGURE 17d**


Parmelia subtiliacea Nylander, 1885:614 [type collection: New Zealand, Knight (H, Nylander herbarium number 35176, lectotype; UPS, isolectotype)].

Parmelia tiliacea var. feracissima Miiller Argoviensis, 1886:256 [type collection: Guntawang, New South Wales, Australia, Hamilton 5 (G, lectotype)].

DESCRIPTION.—Thallus adnate on twigs, whitish mineral gray, 3–5 cm broad; lobes subirregular, black rimmed, 1.5–3 mm wide; upper surface plane to rugulose or foveolate; lower surface black, sparsely rhizinate. Apothecia common, substipitate, 1–5 mm in diameter; spores 8, 6–7 × 12–14 μm.

CHEMISTRY.—Cortex K+ yellow, medulla negative with all reagents; atranorin, norlobaridone, and neoloxodic acid.

DISTRIBUTION.—Australia and New Zealand.

HABITAT.—On rocks in open areas at about 1000 m elevation.

REMARKS.—Pseudoparmelia subtiliacea is the presumptive isidiate morph of P. tortula, a species with identical chemistry, which occurs chiefly in South Africa. Both are saxicolous African endemics unique in producing norlobaridone and neoloxodic acid.

SPECIMENS EXAMINED.—See Hale (1973b) for records from Uganda and Kenya.

**Pseudoparmelia texana**

**FIGURE 17f**


Parmelia texana Tuckerman, 1858:424 [type collection: Blanco, Texas, Wright (FH, lectotype; M, US, isolecotypes)].


Parmelia confluentes Nylander, 1875:725 [type collection: St. Paul (H, Nylander herbarium number 35178, lectotype; BM, PC, UPS, isolecotypes)].

Parmelia cingalensis Stirton, 1876:159 [type collection: Galle, Ceylon (BM, lectotype); illegitimate name].

Parmelia leptophylla Miiller Argoviensis, 1891:377 [type collection: Baziya, South Africa, Baer 714 (BM, lectotype; G, isolecotype)].

Parmelia exoriens Stirton, 1899:76 [type collection: Usambara (Tanganyika), Africa, Holst 787 pro parte (G, lectotype)].

Parmelia tenuirinia stirtonii sorediata Muller Argoviensis, 1894:258 [type collection: Usambara (Tanganyika), Africa, Holst 787 pro parte (G, lectotype)].

Parmelia exoriens Stirton, 1899:76 [type collection: Brisbane, Australia, Bailey 215 (BM, lectotype; GLAM, isolecotype)].

Parmelia symmiga Hue, 1899:168 [type collection: Coonoor, Nilgherries Mountains, India, Gray (PC, lectotype)].

Parmelia subconfluentes Magnusson, 1942:5 [type collection: Puu Waawaa, north of Hualalai, Hawaii, Selling 5669 (S, holotype)].
Parnelia manganotii des Abbayes, 1951:969 [type collection: Mankono, Circlet of Séguéla, Ivory Coast, des Abbayes (REN, lectotype; US, islectotype)].

Parnelia pseudorutidota Asahina, 1952:17 [type collection: Nagachi, Shinshu, Japan, Takahashi (TNS, lectotype)].


Parnelia albaniensis Dodge, 1959:121 [type collection: forests of Albany, Cape of Good Hope, Union of South Africa, Zeyher 3 (FH–Tayl, holotype)].

**DESCRIPTION.**—Thallus closely adnate on trees or rocks, ashy white, 6–12 cm broad; lobes sublinear to subirregular, apically subrotund, 3–5 mm wide; upper surface plane to rugulose, usually deeply rimose, sorediate, the soralia laminal, punctiform to capitate, in part initially pustulate with formation of subirregular to sublinear, apically subrotund, 3–5 mm wide; upper surface plane to rugulose or undulate, twisted and contorted when free from the substratum; lower surface white or faintly pruinose; the margins. Apothecia rare, 2–5 mm in diameter; spores 8, 6–7 × 9–11 μm.

**CHEMISTRY.**—Cortex K + yellow, medulla K −, C−, KC + pale violet or KC −, P−; atranorin, divaricatic acid, and associated unknowns.

**DISTRIBUTION.**—Pantropical outside of Europe and pantropical at higher elevations.

**HABITAT.**—On trees (Acacia, Eucalyptus, Juniperus, Pinus, Quercus) and more rarely on rocks in open or secondary forest and in parks and gardens at 50–2400 m elevation.

**REMARKS.**—This is one of the most widespread species in the genus and while not usually occurring in as great abundance, for example, as P. caperata (L.) Hale, it is well represented, if not frequently misidentified, in most large herbaria. The range of morphological variation is small and the chemistry uniform and distinctive. It is difficult to understand why so many lichenologists failed to recognize it. The nonsorediate progenitor may be considered by the African P. nairobiensis (Steiner and Zahlbrucker) Hale and the companion isidiate morph by P. concrescens (Vainio) Hale.


**Pseudoparmelia tortula**

**Figure 18a**


**DESCRIPTION.**—Thallus closely adnate on rock, whitish mineral gray, 5–10 cm in diameter; lobes subirregular to sublinear, apically subrotund, 1.5–4 mm wide, often twisted and contorted when free from the substratum; upper surface plane to rugulose or undulate, continuous, sometimes faintly pruinose; lower surface pale brown, sparsely rhizinate, the rhizines brown. Apothecia adnate to substipitate, 1–5 mm in diameter; spores 5–6 × 7–9 μm.

**CHEMISTRY.**—Cortex K + yellow, medulla K −, C−; KC− or KC + faint rose, P−; atranorin, norlobaridone, and neoloxodic acid.

**DISTRIBUTION.**—Union of South Africa.

**HABITAT.**—On rocks in open treeless or sparsely vegetated areas up to 1000 m elevation.

**REMARKS.**—This rather undistinguished lichen is still known only from South Africa, where it seems to be quite common. The presumptive isidiate
Figure 18.—Species of Pseudoparmelia: a, P. tortula (Almborn 4805, holotype in LD); b, P. vanderbylirii (Almborn 5110 in US); c, P. venezolana (Hale 45526a, holotype in US); d, P. violacea (Almborn 1771, holotype in LD); e, P. xanthomelaena (Maas Geesteranus 12145 in US); f, P. zambiensis (Jellicoe 50, holotype in BM); g, P. zimbawensis (Høeg, holotype in TRH). (Scale in mm.)
Pseudoparmelia vanderbylii

**Figure 18b**


_Parmelia vanderbylii_ Zahlbruckner, 1932a:252 [type collection: Union of South Africa, Van Rhynsdorp, Cape Province, _P. A. van der Byl_ (W, lectotype)].

**Description.**—Thallus closely adnate on rocks, brownish or dark mineral gray, 3–6 cm broad; lobes subirregular, apically subrotund, contiguous, 1–2 mm wide; upper surface plane, shiny, rimose with age; lower surface pale brown, sparsely rhizinate, the rhizines pale brown. Apothecia common, sessile, 1–2 mm in diameter; spores 8, 6 × 8–10 μm.

**Chemistry.**—Cortex _K_+ yellow, medulla _K_–, _C_–, _KC_– or _KC_+ rose, _P_+ red; atranorin and protocetraric acid.

**Holotype.**—Venezuela: Táchira, Pico Banderas, Páramo de Tamá, elevation 3200 m, _M. E. Hale_ 45526a, 27 March 1975 (US).

**Remarks.**—This inconspicuous species is easily overlooked in the high paramo areas where it appears to be confined. This is the highest elevation at which the genus is found. There seem to be no close relatives. It would more likely be confused with _Parmeliopsis_, which is characterized by the presence of thamnolic acid.

**Specimens Examined.**—Venezuela: Táchira, _Hale_ 45499a, 45523, 45528a.

_Pseudoparmelia violacea_ **Figure 18d**


_Parmelia violacea_ Kurokawa in Hale and Kurokawa, 1964: 158 [type collection: Blinkwater Ravine, Table Mountain, Cape Province, Union of South Africa, _Almborn_ 1771 (LD, holotype)].

**Description.**—Thallus closely adnate on rock, greenish mineral gray, 3–6 cm in diameter; lobes sublinear, 1–3 mm wide; upper surface plane to distinctly rugulose, continuous; medulla vinaceous purple; lower surface pale brown, moderately rhizinate, the rhizines pale. Apothecia adnate, 1–1.5 mm in diameter; spores not developed.

**Chemistry.**—Cortex _K_+ yellowish, medulla _K_–, _P_–; unidentified anthraquinones.

**Distribution.**—Union of South Africa.

**Habitat.**—On exposed rocks in open areas.

**Remarks.**—This remarkable species has been re-collected once since the original description. It is another typical saxicolous African endemic verging close to _Xanthoparmelia_. The pigments are, in fact, very close to those of _X. endomiltoides_ (Nylander) Hale, one being identical. No lichen substances are present in the cortex.

**Specimens Examined.**—Union of South Africa: Cape Province, _Degelius SA-70_ (Degelius herbarium, US).
**Pseudoparmelia xanthomelaena**

*Figure 18c*


*Parmelia xanthomelaena* Müller Argoviensis, 1883a:48 [type collection: Grampian Mountains, Australia, Sullivan 28 (G, lectotype)].

**DESCRIPTION.**—Thallus closely appressed on rock, buff mineral gray but darkening to brownish olive gray at the center, 3–5 cm broad; lobes sublinear, contiguous, lobulate, 0.5–1.5 mm wide; upper surface plane, shiny, transversely rimose with age; lower surface black, moderately rhizinate. Apothecia common, adnate, up to 1 mm in diameter; spores 8, 6 × 7–10 μm.

**CHEMISTRY.**—Cortex K+ yellow, medulla K+, yellow, C—, KC—, P+ orange; atranorin, stictic acid, and constrictic acid.

**DISTRIBUTION.**—Union of South Africa and Australia.

**HABITAT.**—Exposed rocks from sea level to 250 m elevation.

**REMARKS.**—This is one of the smallest species of *Pseudoparmelia*. It is probably difficult to collect since it cannot be removed free of the rock substratum. There are no obviously related species in the genus, unless we consider *P. ischnoides* (Kurokawa) Hale as a possible isidiate morph.

**SPECIMENS EXAMINED.**—Union of South Africa: Basutoland, Koffer (LD); Cape Province, Almborn 127, 275, 1136a, 1444, 1546, 1705, 3025, Degelius SA–537 (Degelius herbarium), Maas Geesteranus 12145 (L).

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**Pseudoparmelia zambiensis**

*Figure 18f*


**DESCRIPTION.**—Thallus adnate on bark, greenish yellow, 4–6 cm broad; lobes subirregular, crowded, 2–3 mm wide, becoming lobulate toward the center; upper surface plane to rugulose, rimose with age; lower surface black, sparsely rhizinate, the rhizines thick, black. Apothecia common, adnate 2.5–3.0 mm in diameter; spores 8, 6 × 12 μm.

**CHEMISTRY.**—Cortex K—, medulla K—, C—, KC— or KC+ faint rose, P—; usnic acid and di- varicatic acid with associated unknowns.

**DISTRIBUTION.**—Central Africa.

**HABITAT.**—On trees in open areas at 2300 m.

**REMARKS.**—This is another African species that will surely be collected more often as lichenologists visit the continent. It appears to be the nonisidiate progenitor of *P. ecaferata* (Müller Argoviensis) Hale, which has a wide range in Africa and Asia. It could also be considered as the usnic acid chemical counterpart of *P. nairobiensis*, which contains atranorin only in the cortex. A full understanding of the relations of these species can only be gained when more specimens are collected.

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**Pseudoparmelia zimbabwensis**

*Figure 18g*


**DESCRIPTION.**—Thallus closely adnate on rock, fragile, light mineral gray, 2–5 cm broad; lobes sublinear, contiguous, black-marginate, 1.0–1.5 mm wide; upper surface plane to rugulose, in part pruinose, postulate, the postules thick, apically pruinose and finally erupting without soredial formation; lower surface black, moderately rhizinate, the rhizines black. Apothecia not seen.

**CHEMISTRY.**—Cortex K+ yellow, medulla K—, C—, KC—, P+ red; atranorin and protocetraric acid.

**DISTRIBUTION.**—Rhodesia and Union of South Africa.

**HABITAT.**—On boulders in open areas.

**REMARKS.**—The postules of this species are similar to those of *P. pusutlescens* (Kurokawa) Hale, a somewhat larger species containing sekikaic acid (P—).

**SPECIMENS EXAMINED.**—Union of South Africa: Transvaal, Almborn 6108, 6491, 6496 (LD).

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**Doubtful and Rejected Names**


The type collection could not be found. A specimen in Acharius' herbarium labeled "Parmelia appressa" appears to be identical with *Pseudoparmelia sphaerospora* (Nylander) Hale. How-
ever, Sprengel mentioned affinity with *Parmelia perforata* and *P. perlata*, both large *Parmotrema* species.


The type specimen is probably in PC but I was not able to locate it there.

*Parmelia protorevoluta* Gyelnik, 1931b:288.

*Parmelia revoluta* f. *nuda* Müller Argoviensis, 1891:378 [type collection: Santarem, Brazil, *Spruce* 135 (G, lectotype; BM, isolectotype)].

The fragmentary type collections contain divaricatic acid. This is almost certainly a *Pseudo-parmelia*, perhaps *P. nairobiensis* (Steiner and Zahlbruckner) Hale, a presumed African endemic.


This variety is based on two collections, one *Thomson* ZA217 from Southland, New Zealand, which is *Parmelia rudecta* Acharius, and the other *Cranwell* ZA242 from Coromandel Peninsula, New Zealand, which can be identified as *Parmotrema crinitum* (Acharius) Choisy. Both specimens are preserved in W.


This is based on *Parmelia farinosa* Vainio (1890:62) (*Lichenes Brasilienses Exsiccati* 551 in TUR). It is a species of *Xanthoparmelia* (Vainio) Hale.


This is a species of *Xanthoparmelia* (Vainio) Hale.


This is also a *Xanthoparmelia*.

*Pseudoparmelia aradensis* Gyelnik, 1933:6.

Culberson and Culberson (1969:515) place this species in synonymy under *Cetrelia olivetorum* (Nylander) W. Culberson and C. Culberson.

*Pseudoparmelia euplecta* (Stirton) Hale, 1974:190.

I have tentatively placed this species as a synonym of *Pseudoparmelia caperata* in the “Taxonomic Treatment.”

*Pseudoparmelia leucopis* (Krempelhuber) Hale, 1974:190.

*Parmelia leucopis* Krempelhuber, 1878:461 [type collection: *Lorentz and Hieronymus*, Argentina (M. lectotype)].

After reexamining the type collection, I found some cilia in the lobe axils. These would exclude the species from *Pseudoparmelia*, and I hesitate to reassign it to another genus until better material is available.

*Pseudoparmelia meiosperma* (Hue) Hale, 1974:190.


The type-specimen has rather broad lobes with dense isidia. The rhizines are dense and more or less branched. The chemical constituents include atranorin, evernic acid, and traces of lecanoric acid, a combination that is known in several species of *Hypotrachyna* (Hale, 1975a) but in no *Pseudoparmeliae*. It does not fit well in *Pseudoparmelia* and until additional material is available it is impossible to settle its generic position.

*Pseudoparmelia pseudofallax* Gyelnik, 1933:6.

Culberson and Culberson (1968:459) consider this to be a species of *Cetrelia* but not having examined the type collection they could not decide which one.

*Pseudoparmelia pseudofallax* var. *cretaceoides* Gyelnik, 1933:7.

This taxon also belongs in the *Cetrelia cetrarioides* complex.


This has been reduced to synonymy under *Pseudoparmelia caperata* in the “Taxonomic Treatment” above.
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