

The occurrence in southern Africa of the hepatic, *Symphyogyna brasiliensis* (Pallaviciniaceae)

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Keywords: hepatic, Metzgeriales, Pallaviciniaceae, southern Africa, *Symphyogyna brasiliensis*, *S. lehmanniana*

ABSTRACT

In Magill & Schelpe (1979) *Symphyogyna lehmanniana* is confirmed as occurring in southern Africa. Subsequently, however, Grolle (1980) reported that this name, which has been applied to a liverwort widespread in Africa, is a synonym of *S. brasiliensis*. To draw attention to this synonymy, a description of *S. brasiliensis*, illustrated with photographs, is given here, as well as an account of its distinguishing features and its distribution.

UITTREKSEL

In Magill & Schelpe (1979) word die teenwoordigheid van *Symphyogyna lehmanniana* in suidelike Afrika bevestig. Daarna berig Grolle (1980) egter dat hierdie naam, wat vir 'n wydverspreide lewermos in Afrika gebruik is, 'n sinoniem is van *S. brasiliensis*. Om die aandag op hierdie sinonimie te vestig, word 'n beskrywing van *S. brasiliensis*, geïllustreer met foto's, sowel as inligting oor sy onderskeidende kenmerke en verspreiding hier gegee.

INTRODUCTION

In Magill and Schelpe's (1979) checklist, *Symphyogyna lehmanniana* is listed as one of the species of *Symphyogyna* occurring in southern Africa.

Subsequently, however, Grolle (1980) concluded that this name, applied to a liverwort reported to be widespread in Africa, is a synonym of *S. brasiliensis*. During the course of his investigations Grolle had compared specimens assigned to both species, their types, as well as spores, and could find no differences. He had also examined a number of other specimens, previously assigned to several so-called different species of *Symphyogyna* and *Pallavicinia*, all of which he eventually placed in synonymy under *S. brasiliensis*. Three of these species, namely *S. lehmanniana*, *S. valida* and *Pallavicinia capensis*, have types which were collected in southern Africa. The following description of *S. brasiliensis*, which is illustrated with photographs, is given to draw attention to the above information.

The two Metzgerialean genera, *Symphyogyna* and *Pallavicinia* were previously placed in the family Dilaenaceae (Dum.) Warnst. by Arnell (1963) and by Schuster (1964, 1982), but this name is illegitimate (Grolle 1972). They are now classified by Grolle (1983) in the family Pallaviciniaceae Migula and are placed in different subfamilies, the Symphyogynoideae (Trev.) Schust. and the Pallavicinioideae (Migula) Grolle respectively. They are frondose liverworts, characterized by thinly winged thalli with a thicker midrib, containing a median conducting strand of elongate, tapering cells with thickened, perforated walls. The thalli are often stipitate and are either procumbent or erect; their margins are entire, dentate, undulate or lobate; the epidermal cells are \pm rectangular and lack nodular thickenings and the capsules are

elongated. The two genera are separated by the type of protection provided for the archegonia and young sporophyte: in *Pallavicinia* the archegonia, and after fertilization, the pseudoperianth and capsule, are surrounded by a short tubular or annular involucre; in *Symphyogyna* the archegonia are subtended by a lacinate, scale-like involucre with the margins of the latter free and directed forward, no pseudoperianth is developed after fertilization and the young sporophyte is enclosed only by the shoot-calyptra, which has a cluster of unfertilized archegonia at its tip.

***Symphyogyna brasiliensis* Nees & Mont.** in *Annales des sciences naturelles, Botanique sér. II.5*: 67 (1836). Type: Brazil, Est. Minas Geraes, São João Batista, *Martius s.n.* (STR, lecto.).

S. lehmanniana (Mont. & Nees) Gottsche *et al.*: 483 (1846). Type: Cape Province, Table Mountain, 'in Promontorio Bonae Spei in vertice ad latus boreale montis Tabularis locis umbrosis', *Ecklon s.n.* (STR, lecto.).

S. tenuicostata Steph.: 306 (1895). Type: Tanzania, Usambara, *Holst 688* (JE, W, iso.).

S. valida Steph.: 69 (1917); syn. fide S. Arnell: III (1963). Type: Zululand, Eshowe, *Haakon s.n.* (JE, M, UPS, iso.).

Pallavicinia capensis S. Arnell: 177 (1954); syn. fide S. Arnell: III (1963). Type: Cape Province, Knysna, Gouna (not Guona) Forest, *S. Arnell 1769* (PRE, holo.; UPS, iso.).

Terricolous, growing on damp soil; thallose, prostrate and creeping (Figures 1A; 2B), in crowded, overlying mats, bright green when fresh, rarely developing a purplish or reddish tinge along margins and over costa, linear, simple or dichotomously branched, sometimes with ventral intercalary branching, medium-sized to large, 10–20 \times 2–3 mm, 280 μ m thick over ventrally bulging costa, from which arise pale brownish, translucent rhizoids, smooth and mostly \pm 12.5 μ m wide; apex entire or with a shallow notch (Figure 1B), the two halves very slightly overlapping in centre, bearing numerous 2-celled slime papillae, \pm 65 \times 20 μ m (Figure 1B), these also present ventrally near the apex; margins entire, undulate, without slime papillae. *Wings* translucent, unistratose,

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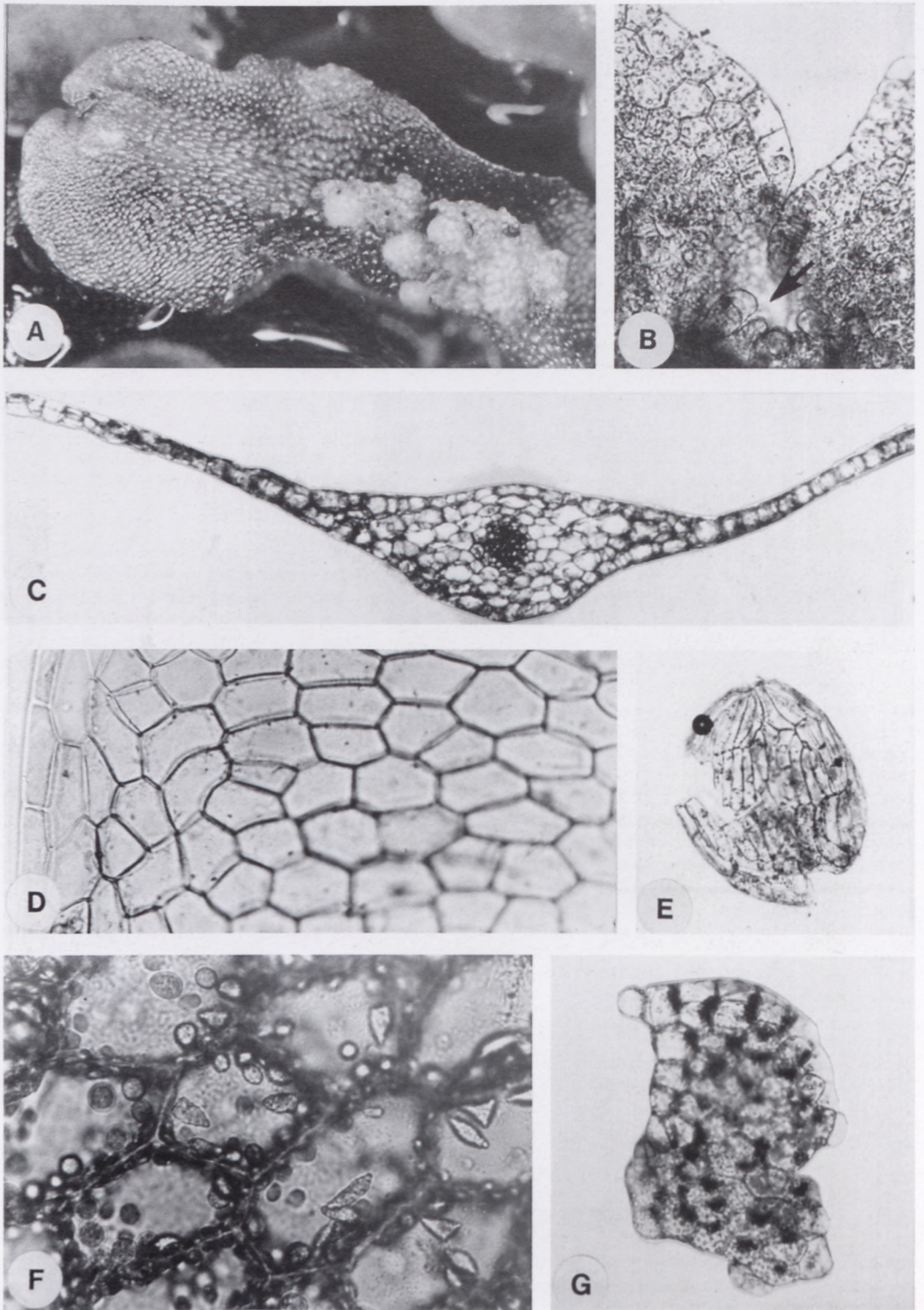


FIGURE 1.—*Symphyogyna brasiliensis*. A, male thallus with androecia; B, apical notch of thallus with slime papillae (indicated by an arrow); C, cross section of thallus showing costa with central conducting strand and unistratose lateral wings; D, marginal and laminal cells seen from above; E, antheridium; F, oil bodies and chloroplasts visible inside cells; G, scale-like involucre which partly covers antheridium. A–G, *Glen* 2687. A, $\times 22$; B, F, $\times 350$; C, E, G, $\times 87$; D, $\times 175$.

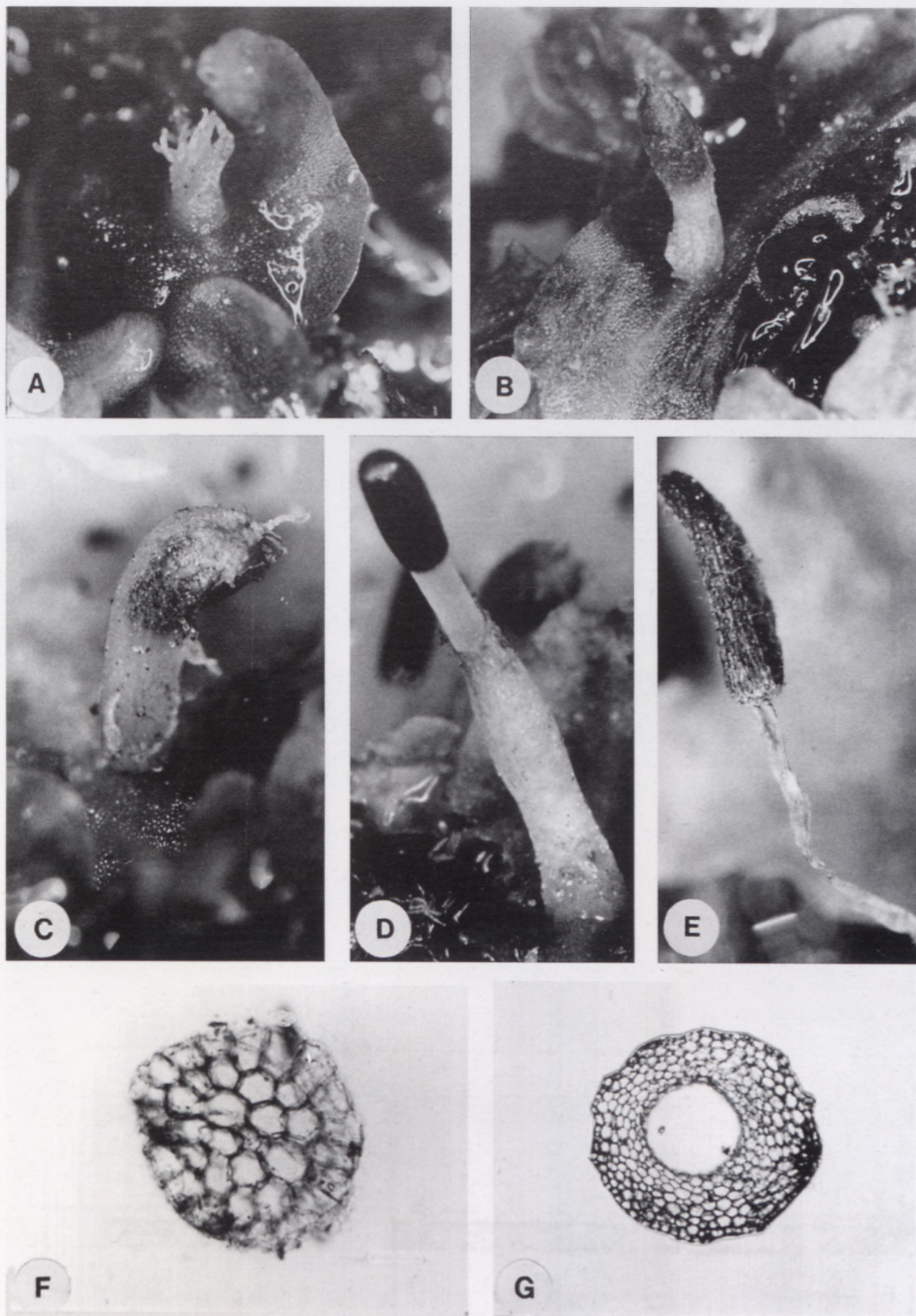


FIGURE 2. — *Symphyogyna brasiliensis*. A, female thallus with cluster of archegonia; B–E, various stages in maturation of capsule: B, C, young capsule enclosed in calyptra; D, capsule and seta emerged from calyptra; E, capsule with ripe spores and long, tenuous seta; F, cross section of seta; G, cross section through middle of shoot-calyptra. A–G, *Glen 2687*. A, B, E, $\times 24$; C, $\times 34$; D, $\times 30$; F, $\times 110$; G, $\times 40$.

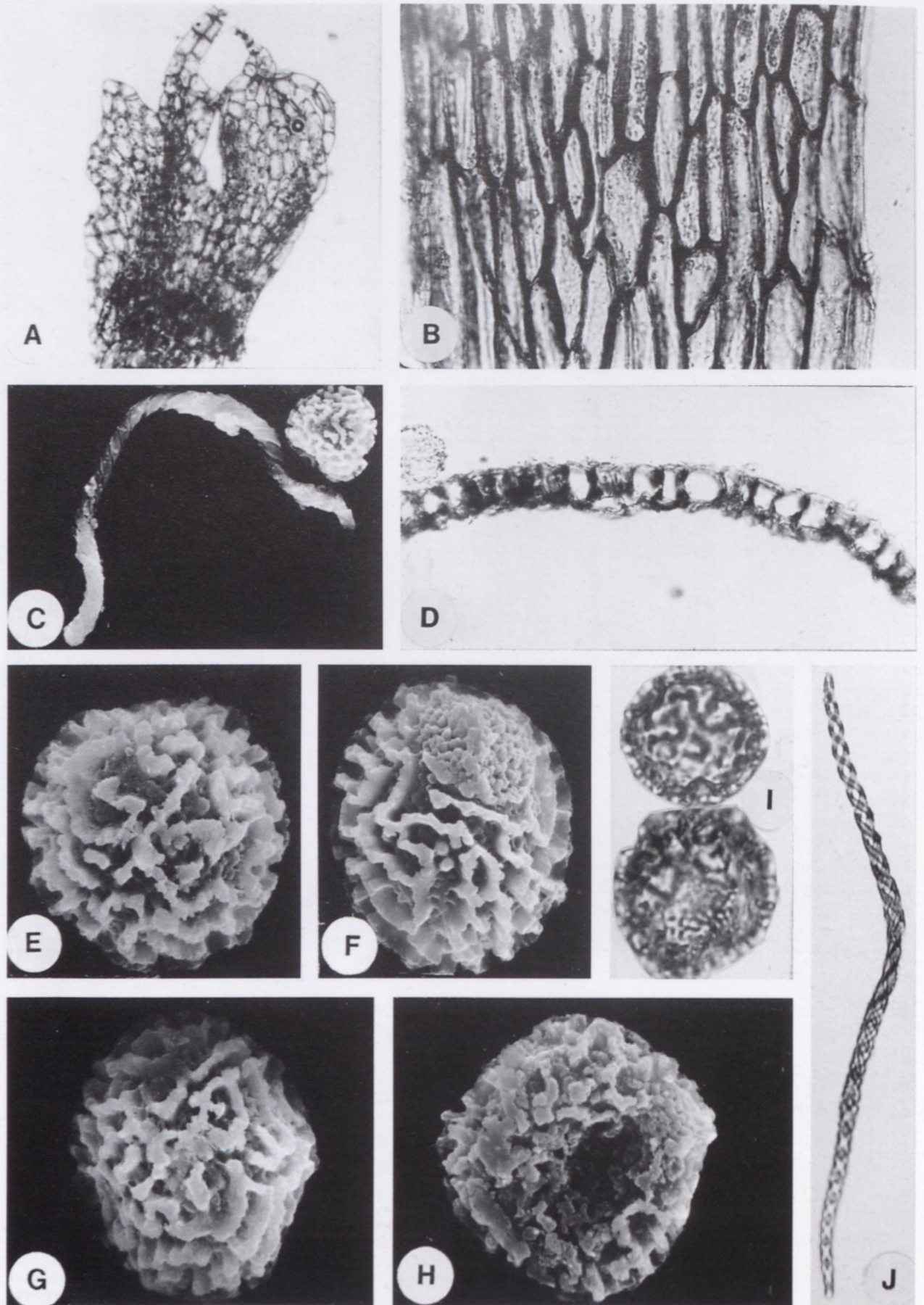


FIGURE 3.—*Symphyogyna brasiliensis*. A, laciniate scale-like involucre which subtends each archegonium; B, cells in capsule wall; C, J, elaters; D, cross section of capsule wall, only outer cells shown; E–I, spores; . A–J, *Glen 2687*. A, $\times 35$; B, D, $\times 175$; C, $\times 58$; E, F, $\times 1750$; G, H, $\times 1630$; I, $\times 1000$; J, $\times 550$. C, E–H, SEM micrographs; A, B, D, I, J, LM photographs, all taken by the author.

medianly 2 or 3 cells thick, rather abruptly grading into the roughly triangular costa; outer row of cells along margin generally rectangular, $\pm 50.0 \times 27.5 \mu\text{m}$, otherwise cells 5- or 6-sided, $50-75 \times 30.0-37.5 \mu\text{m}$ (Figure 1D) and $\pm 40 \mu\text{m}$ thick in section, containing numerous chloroplasts and fusiform or \pm triangular oil bodies (Figure 1F). *Costa* with a central conducting strand (Figure 1C), $\pm 45 \mu\text{m}$ wide, brownish to purple, formed of strongly elongated, small cells, $\pm 10.0 \times 7.5 \mu\text{m}$, with straight, thickened walls, the enclosing cells up to 10 or 11 rows deep, hyaline, much larger, mostly $50.0 \times 27.5 \mu\text{m}$, irregular in shape, walls thin and wavy.

Dioicous. *Androecia* usually in 2 crowded (Figure 1A), more or less parallel rows over the costa and lateral to it on either side, each short-stalked antheridium (Figure 1E) partially covered by an irregularly shaped, dentate or entire, forwardly-directed, scale-like involucre (Figure 1G), $\pm 800 \times 450 \mu\text{m}$, its cells mostly $67.5 \times 45.0 \mu\text{m}$, with age antheridia turn yellow and cell walls of scales darken. *Gynoecia* generally one to several per frond, in acropetal succession, situated dorsally over the costa and containing several archegonia in a cluster (Figure 1A), which is subtended by a posteriorly inserted, scale-like involucre (Figure 2B), sometimes partly double toward the base, generally deeply lacinate (Figure 3A), $850-110 \times 500-750 \mu\text{m}$, its cells $\pm 72.5 \times 50.0 \mu\text{m}$. *Calyptra* thickening and enlarging into a fleshy shoot-calyptra, up to 3 mm long and as much as 10 cell rows or $260 \mu\text{m}$ thick in cross section (Figure 2G), with several unfertilized archegonia at the tip (Figure 2C), before it is perforated by the capsule (Figure 2D). *Capsule* cylindrical (Figure 2E), $2250 \times 650 \mu\text{m}$, opening with 4 valves, wall brown, several cell layers thick, outer cells irregularly elongate (Figure 3B), $\pm 200 \times 20-30 \mu\text{m}$, with cell walls evenly thickened (Figure 3D), inner cells thin-walled. *Seta* when young, erect, $\pm 290 \mu\text{m}$ in diameter, with ± 18 cortical cell rows and ± 16 medullary cells (Figure 2F), eventually becoming long and tenuous (Figure 2E). *Spores* light brown, \pm globular, $25-30 \mu\text{m}$ in diameter, ornamentation with low, irregularly branched, short or long, curly ridges (Figure 3E, G, H), on proximal face a discrete round area with the ornamentation much more densely arranged (Figure 3F). *Elaters* bright brown, tapering to the ends, up to $195 \times 7.5 \mu\text{m}$ wide in the centre, 2-spiral (Figure 3C, J).

Symphogyna brasiliensis is widespread throughout Africa, occurring in Sierra Leone, Ghana (Jones & Harrington 1983), the Cameroons, Zaïre, Rwanda, Burundi, Tanzania, Angola, Zimbabwe, as well as on the islands of Madagascar, Mauritius, Réunion, Saint-Benoit, St Helena and Ascension (Grolle 1980; Vána *et al.* 1979, reported as *S. lehmanniana*). In the Neotropics it is known from Mexico to Bolivia, Uruguay and Brazil (Grolle 1980).

Gradstein *et al.* (1983) reported it to be widely distributed in the tropical mountains of the two continents, Africa and South America, at altitudes between 1 500 and 3 000 m, whereas in subtropical Brazil, the Cape Province and on the Galapagos Islands it descends to near sea level.

In southern Africa it has been collected in northern, eastern, central and southern Transvaal, in Swaziland, Natal and Zululand, as well as in the southwestern and southern Cape (Figure 4).

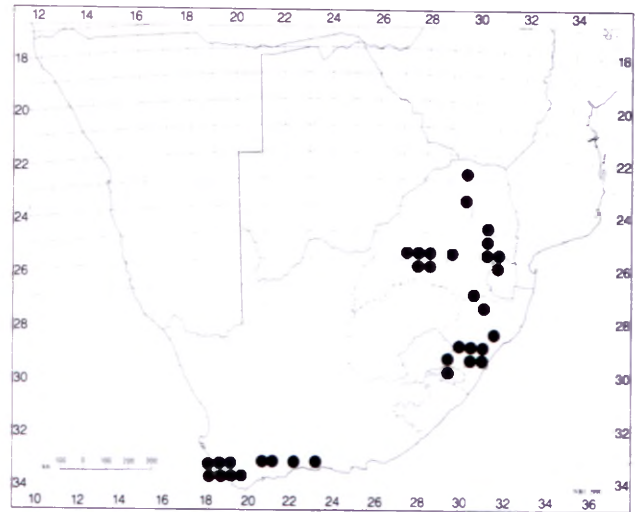


FIGURE 4. —The distribution of *Symphogyna brasiliensis* in southern Africa.

Symphogyna brasiliensis is terrestrial, growing on damp streambanks, along footpaths or in forested areas. It differs from the other species in the genus by its procumbent habit, by the entire margins of the thallus, by its slightly larger spore size and by its somewhat finer spore ornamentation. *S. filicum* Nadeaud from Cameroon Mountain is similar to *S. brasiliensis*, except that the small cells in the central strand are thin-walled (Jones 1990) and the spore sculpture is different. It was recently segregated as a separate genus, *Symphogynopsis*, by Grolle in Grolle & Piippo (1986). *Symphogyna volkensii* Steph. is more robust (Vanden Berghen 1965) than *S. brasiliensis* and has scattered slime papillae along the wing margins and different spore ornamentation (Grolle pers. comm.).

As vegetative propagation is unknown, dispersal of *S. brasiliensis* must be by long range aerial transport of its spores. Its presence on young volcanic islands would support this assumption.

SPECIMENS EXAMINED

TRANSVAAL. —2229 (Waterpoort): Soutpansberg, Lokorhela 793 Farm, ± 500 m upstream of waterfall, streambank in forest, 1 320 m altitude, (–DD), *Glen 2687* (PRE). 2329 (Pietersburg): The Downs, Pietersburg. (–CD), *Junod 4011b* (PRE); Woodbush For. Res., Magoebaskloof, on roadside embankment. (–DD), *H. Anderson CHI3496* (PRE); Houtboschdorp. (–DD), *D.R.J. Van Vuuren 1478a* (PRE). 2430 (Pilgrim's Rest): Mariepskop, immediately W of dam in Klaserie River, on wet earth bank. (–DB), *Vorster 511, 575* (PRE); Mariepskop, near forestry station in riverine montane forest, on shale embankment, (–DB), *Vorster 783* (PRE). 2527 (Rustenburg): Buffelspoort, Krom River. (–CD), *Bottomley & Doidge CH3603* (PRE); Bokfontein, Farm Jacksonstun, (–DA), *Mogg CHI3173* (PRE). 2528 (Pretoria): Magaliesberg, Boekenhoutskloof. (–CB), *Mogg CHI562, CH2858* (PRE). 2529 (Witbank): Dist. Verena, 24 km E of Bronkhorstspruit, on road to Susterstroom, Farm Klipfontein, in gully. (–CA), *S.M. Perold 452* (PRE); Klipfontein no. 87, in open glades at streamside. (–CC), *Mogg 12561* (PRE). 2530 (Lydenburg): 10 km E of Lydenburg, in road stone quarry, off Sabie/Lydenburg road. (–AB), *Rankin 53* (PRE); Rooiwal, in ravine. (–BD), *Bosman 3178* (PRE); Rosehaugh. (–BD), *T.R. Sim 7585* (PRE); Kaapsche Hoop. (–DB), *V.A. Wäger 65* (PRE). 2531 (Komatiipoort): Barberton. (–CC), *Hendry 2* (PRE). 2627 (Potchefstroom): Witpoortjie, near Johannesburg. (–BB), *Moss CHI465* (PRE); Witpoortjie kloof, on damp bank. (–BB), *C.S. & M. Moss CHI479* (PRE). 2628 (Johannesburg): Johannesburg. (–AA), *Edwards CHI461* (PRE). 2730 (Vryheid): Wakkerstroom Dist., Farm Oshoek. (–AD), *Glen 1676* (PRE).

SWAZILAND. —2531(Komatiipoort): Horo Forest. (–CB), *V.A. Wäger 92* (PRE). 2631 (Mbabane): Mbabane. (–AC), *Rodin CH3975* (PRE); Mbabane. (–AC), *Edwards CHI447* (PRE).

NATAL.—2730 (Vryheid): Scheepers' Nek, (—DC), *T.R. Sim* 8231 (PRE); Vryheid, (—DD), *T.R. Sim* CH1452 (PRE). 2831 (Nkandla): Eshowe, Signal Hill, (—CD), *Van der Plank* CH1446 (PRE). 2929 (Underberg): 0.5 km N of Tabamhlope Police Sta., towards Draycott, on vertical to overhanging streambank, (—BA), *Glen* 1693 (PRE); Rosetta, (—BD), *T.R. Sim* CH1470 (PRE); 1 km beyond Sani Pass Hotel, streamlet at roadside, (—CB), *S.M. Perold* 2501 (PRE). 2930 (Pietermaritzburg): Buccleuch, (—AD), *T.R. Sim* CH1471 (PRE); Ndwedwe, Zwatini Kloof forest, on moist cliff, (—BD), *Strey* 7757 (PRE); Pietermaritzburg, Chase Valley, (—CB), *Bews* CH4466 (PRE); Zwaartkop, (—CB), *T.R. Sim* CH1482 (PRE); Hilton Road, (—CB), *T.R. Sim* CH1454, CH1469, CH1483 (PRE); Sweetwaters, (—CB), *T.R. Sim* CH1466, CH1476 (PRE); Inchanga, at stream, (—DA), *T.R. Sim* CH1451, CH1468, CH1484, CH1486 (PRE); New Germany, (—DD), *Moonsammy* 21 (PRE); *Van der Byl* 21 CH1460 (PRE). 3029 (Kokstad): Kingston, (—AA), *T.R. Sim* CH1485 (PRE).

CAPE.—3318 (Cape Town): Table Mtn, Disa Ravine, alt 2500 ft., (—CD), *T.R. Sim* CH4414 (PRE); Stellenbosch, (—DD), *Duthie* CH1459 (PRE). 3319 (Worcester): Kloof off Bain's Kloof, (—CA), *Primos* CH1475 (PRE); Groot Drakenstein Mts, (—CC), *Primos* CH4471 (PRE); Du Toit's River bridge, at rock face next to road, (—CC), *S.M. Perold* 1151 (PRE); 4 km N of Villiersdorp, Elands River road, Du Toitsberge, near waterfall, (—CD), *S.M. Perold* 624 (PRE). 3320 (Montagu): warm bath at Uitvlugt, near Barrydale, (—DC), *Muir* CH4103 (PRE). 3321 (Ladismith): Garcia's Pass, (—CC), *Muir* CH1467 (PRE). 3322 (Oudtshoorn): George, (—CD), *H.A. Wager* CH1449 (PRE), *Wager s.n.*, 41 (PRE). 3323 (Willowmore): Keurbooms Rivier, (—CD), *Burt Davy* 17033 (PRE). 3418 (Simonstown): Kalk Bay, (—AB), *Potts* CH1473 (PRE); Gordon's Bay, Felswände südlich dem Dorfe, (—BB), *Cholnoky* 386 (PRE); Kogelberg near Gordon's Bay, (—BB), *Mogg* CH938 (PRE). 3419 (Caledon): Hermanus Dist., Riviera Kloof, (—AC), *Louwrens* CH2893 (PRE); Voëlgat, (—AC), *Louwrens* CH3715 (PRE); Mossel River, (—AD), *Potts* CH4475 (PRE); Greyton Kloof, on earth bank, (—BA), *S.M. Perold* 1164 (PRE). 3423 (Knysna): Knysna, Gouna (not Guona) Forest, (—AA), *Arnell* 1769 (type of *Pallavicinia capensis*), 1790 (PRE); Knysna, (—AA), *Arnell* 1476 (PRE); Gouna For. Res., N of Knysna, on damp earth bank at stream, (—AA), *S.M. Perold* 904 (PRE).

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