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NEW SPECIES OF *STYLIDIUM*, AND NOTES ON
STYLIDIACEAE FROM SOUTHWESTERN AUSTRALIASHERWIN CARLQUIST¹Claremont Graduate School and Rancho Santa Ana Botanic Garden
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ABSTRACT

Three new species of *Stylidium* from southwestern Australia are described. *Stylidium nonscandens* is most closely related to *S. scandens*, of which it may be regarded as a northern sandplain vicariant with sufficient morphological difference for specific recognition, just as *S. verticillatum* is a montane vicariant of *S. scandens*. *Stylidium expeditionis* is a new species known only from the Tutanning Reserve near Pingelly; it is in the section Squamosae, and several species can be cited as bearing relationship to it. *Stylidium ricae* is the name given to a plant of granitic outcrops near Morawa and Mullewa; it was formerly designated *S. macrocarpum* var. *planifolium*, but is amply distinct although related to *S. macrocarpum* and *S. pycnostachyum*. The three new species are illustrated photographically, using photomacrographic detail. Additional notes on species of Stylidiaceae described in 1969 are given.

In an earlier paper (Carlquist, 1969), I predicted that additional species of *Stylidium* remained to be discovered in Australia. During my 1974 expedition, I found three *Stylidium*s which prove to be new species. In addition, observations made in 1974 with regard to the species described in 1969 are offered in the closing part of this paper. The three new species are described below without citations to figures interspersed into the text, because the reader can easily compare the photographs with the descriptions.

***Stylidium nonscandens* Carlquist, spec. nov.**

FIGS. 1-12

Perennis glabra, 20-45 cm alta. Innovationes erectes, quadrangulares, roseo-brunneae, folia dense rosulata-verticillata, verticillis ca. 6 (2-8) cm inter sese distantibus. Folia ecirrhosa, linearia vel trigono-linearia, glabra, apice acuta, 5-50, saepius 27 mm longa. Racemi terminales solitarii, 3-5 usque 9 cm longe pedunculati, bractae lineari-subulatae acutissimae; pedicelli, 5-1.5 cm longi, prophyllis 2 bracteis similibus minoribus instructi. Calycis lobi acuti, tubo aequilongi, ca. 3 mm longi. Corolla rosacea, tubus brevis, laciniae obovatae, ca. 7 mm longae, ca. 5 mm latae, corolla postice duplo profundius quam lateribus inter lacinias incisa. Appendices faucis 6, ante lacinias posteriores binatae minimae subulato-filiformes, ante anteriores singulae majores, late-oblongae apice acutae rotundatae vel truncatae. Labellum anguste triangulari-ovatum acuminatum, ca. 2 mm longum, glanduloso-ciliolatum, basi appendiculis filiformibus glanduloso-pilosis labello aequilongis instructum. Columna breviter glanduloso-pubescent; thecae antherarum

¹ I acknowledge the help of Mr. Alex George, Mr. Kevin Richards, and Mr. Larry De Buhr during my field work in 1974. This study was aided by a grant from the National Science Foundation, GB 38901.

acutae, basi pilis capitatis numerosis suffultae. Septum ovarii reductum, lunatum; placenta crassa subglobosa, ovulis magnis erectis instructa. Capsula subglobosa 6 mm longa.

Shrublike glabrous perennial 20–45 cm tall, branched from near the base, the innovations erect, with quadrangular reddish-brown stems. Leaves in dense verticillike rosettes, these spaced mostly about 6 (2–8) cm from each other along the stems. Leaves not hooked at tips, linear (triangular in transection) glabrous, apices acute, 5–40 mm long, averaging about 27 mm. Racemes terminal and solitary, the inflorescence axis (“peduncle”) 3–5 or up to 9 cm long, with linear-subulate acute bracts at bases of branches (“pedicels”), these pedicels 0.5–1.5 cm long, bearing pairs of prophylls similar to the bracts but smaller. Calyx lobes acute, about the same length as the tube (ovary), about 3 mm long. Corolla pale rose, tube short, the lobes obovate, about 7 mm long by 5 mm wide, the corolla limb twice as deeply incised dorsiventrally as laterally (lobes united into lateral pairs). Throat appendages 6, the posterior 4 minute and tending to be united into pairs, the anterior 2 larger, broadly oblong, and with acute, roundish or truncate tips. Labellum narrowly ovate-triangular, acuminate, about 2 mm long, glandular-ciliate, provided with a pair of filiform glandular-pilose basal appendages about the same length as the labellum proper. Column covered with short glandular hairs; anther sacs acute, with numerous vesiculate hyaline trichomes clustered around the thecae. Septum of the ovary reduced to a crescent with a thick subglobose basal placenta bearing several large erect ovules. Capsule at maturity about 6 mm in diam.

Holotype.—In white sand, especially abundant on road margins, with mallees, *Isopogon*, *Hakea*, *Conospermum*, 34 mi W of Coorow, Western Australia. October 3, 1974, *Carlquist 5807* (RSA).

Isotypes.—PERTH, CANB, MEL, US, GH, MO, K, NSW, NY and others.

Additional collection.—On white sand, with *Banksia menziesii* R. Br., *Adenanthos*, *Hibbertia*, Red Gully road 3 mi S of junction with Mogumber–Regan’s Ford road. October 6, 1974, *Carlquist 5951* (RSA, PERTH, CANB, MEL, US, GH, MO, K, NSW, NY, E, WTU, UC and others).

Stylidium nonscandens has been named deliberately to compare it to *S. scandens* R. Br., to which it is related. Juvenile shoots of *S. scandens* can be quadrangular and bear linear leaves lacking hooks at their tips as in *S. nonscandens*. However, stems of *S. nonscandens* are always quadrangular (like those of *S. verticillatum* F. Muell.), and leaves never bear hooks at their tips and never form any kind of tendrillike attachment to surrounding vegetation. Indeed, the shrublike plants of *S. nonscandens* grow scattered among

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Figs. 1–4. *Stylidium nonscandens* (*Carlquist 5907*).—1. Habit of small plant in flower.—2. Rosette of leaves terminating one of the stems, illustrating linear nature of leaves, which lack recurved margins.—3. Corolla; face view to show shape of lobes.—4. Center of corolla; column has been arranged atop corolla limb to show details of glandular hairs; throat appendages visible at base of column.

the low shrubbery of depauperate sand heath which consists (except for mallees and Banksias) of growth as low as or lower than the *S. nonscandens* plants. The adult tendril-tipped leaves of *S. scandens* are markedly concave along the midrib above and have recurved margins, features not present in leaves of *S. nonscandens*.

The calyx lobes of *S. nonscandens* are markedly narrow and acute, and thus like those of *S. verticillatum*, whereas calyx lobes of *S. scandens* are broad, rounded, and obtuse. The corolla of *S. nonscandens* is the same size as that of *S. scandens*, but never deep rose in color (as in some populations of *S. scandens*); the lobes are united for about half their length laterally, as in *S. verticillatum*. The throat appendages of *S. nonscandens* are much smaller than those of *S. scandens*. The labellum of *S. nonscandens* is like that of *S. scandens* except that the basal appendages are not long; they are slightly shorter, in fact, than the main lobe of the labellum. The vesiculate hairs among the anthers (figured well by Erickson, 1958, for both *S. scandens* and *S. verticillatum*) are particularly conspicuous in *S. nonscandens* (Fig. 9). The capsules of *S. nonscandens* differ from those of both *S. scandens* and *S. verticillatum* in that those two species have only a globose placenta, whereas a crescentlike septum is present in capsules of *S. nonscandens* (Fig. 12). In this respect, *S. nonscandens* resembles *S. galioides* C. A. Gardner, a species that has large seeds similar to those of *S. nonscandens*. *Stylidium nonscandens* is like *S. scandens* and unlike *S. verticillatum* in that it lacks vestiture except on portions of the flower (glandular-pubescent in all three species).

Stylidium nonscandens is thus a northern vicariant of *S. scandens*. Such characteristics as the acute calyx lobes and presence of a capsule septum show that it is not merely a juvenilistic variant of *S. scandens*. It is to be expected in various areas of the great sandplain around Jurien Bay from Greenhead to Gingin, and might have been discovered previously had this recently opened area been botanized during the brief flowering season of *S. nonscandens*. Plants were particularly abundant along the road west from Coorow, forming conspicuous displays in the segment from 34 to 39 mi W of Coorow.

I was alerted to the possible distinctness of *S. nonscandens* by finding it in these localities so far north of the habitats of *S. scandens*. *Stylidium scandens* is a species of the south coast of southwestern Australia, ranging from approximately Mt. Manypeaks along the Albany and Northcliffe coasts to Bunbury (Erickson, 1958). That area is rich in the Restionaceae on which *S. scandens* so typically climbs. *Stylidium verticillatum* is also a

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Figs. 5-8. *Stylidium nonscandens* (Carlquist 5907). Details of flower.—5. Side view of flower, showing column poised; larger throat teeth and one appendage of the labellum are visible.—6. Side view of flower; the unopened anthers have mucronate tips; vesicular hairs adjacent to the anthers.—7. Side view of flower; the column is in poised condition and at a stage of late anthesis, with stigma (seen in face view) developed.—8. Side view of flower, showing stigma developed; labellum and one of the acute calyx lobes can be seen.

southern species, endemic to scree slopes in the Stirling Range (Carlquist, 1969). *Stylidium verticillatum* can be regarded as a vicariant of the *S. scandens* complex, just as may *S. galioides*, which grows among white quartz boulders in the Mt. Barren range south of Ravensthorpe and Jerramungup.

***Stylidium expeditionis* Carlquist, spec. nov.**

FIGS. 13–21

Perennis mediocris, caudice simplici. Folia basalia, rosulata, erecta, linearia, ca. 9 (4.5–14) cm longa, 1.5–2 mm lata, scabriuscula, obtusa, utrinque bisulcata simillaque. Squamae interstinctae scariosae ca. 2.5 cm longae. Scapus erectus, sparse glanduloso-pilosus, ca. 30 (20–45) cm altus. Inflorescentia racemosa subramosa; rachis pedicelli et calyces breviter glanduloso-pubescentes. Pedicelli ca. 5 mm longi. Calycis tubus ovatus, lobis subaequilongus; lobi lineari, obtusi, ca. 5 mm longi. Corolla alba, laciniae subaequales, spathulatae, ca. 7 (6–8) mm longae, 4–5 mm latae, laciniae posteriores inverso-cucullatae ad anthesim. Appendices faucis 6, ad apices rubrae, 4 minores minutae, binatae, dentiformes, 0.5 mm longae, 2 majores dentiformes, 1 mm longae. Corollae laciniae glandulosae infra. Labellum lanceolato-ovatum, acutum, 1 mm longum, basi appendiculis filiformis, 0.5 mm longis. Columna 7 mm longa; antherae 0.5 mm longae, virides, brunescetes. Capsula ovata glanduloso-pubescent ca. 6 mm longa.

Small perennial, stem unbranched. Leaves basal, in a rosette, erect, about 9 (4.5–14) cm long, 1.5–2 mm wide, minutely scabrous, obtuse, bisulcate on both surfaces, which are virtually identical. Scarious scales at the beginning of each year's growth about 2.5 cm long. Scape erect, sparsely glandular-pilose, about 30 (20–45) cm tall. Inflorescence branches branched; pedicels and calyces shortly glandular-pubescent. Pedicels about 5 mm long. Calyx tube ovate, approximately the same length as the lobes; lobes linear, obtuse, about 5 mm long. Corolla white, lobes subequal, spathulate, about 7 (6–8) mm long, 4–5 mm wide, the upper pair overlapping and forming an inverse hood at anthesis. Appendages of the throat 6, red-tipped, the 4 smaller binate, toothlike, about 0.5 mm long, the two larger toothlike, about 1 mm long. Corolla lobes glandular below. Labellum lanceolate-ovate, acute, 1 mm long, basal appendages filiform, 0.5 mm long. Column 7 mm long, anthers 0.5 mm long, green before opening, turning brown. Capsule ovoid, glandular-pubescent, about 6 mm long.

Holotype.—In white sand with *Stylidium breviscopum* R. Br., *S. squamelosum* DC., *Levenhookia stipitata* (Benth.) F. Muell., *Dryandra*, *Leucopogon*, *Xanthorrhoea*; scrubby area at northwestern corner of Tutanning Reserve east of Pingelly, Western Australia. October 9, 1974, *Carlquist 5960* (RSA).

Isotypes.—PERTH, CANB, MEL, US, GH, NSW, K.

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Figs. 9–12. *Stylidium nonscandens* (Carlquist 5907). Details of flower and fruit.—9. Flower; side view to show glandular pubescence and vesicular hairs on column, which has been displaced so as to reveal the labellum.—10. Throat of flower, face view; throat appendages differ somewhat from those of Fig. 4.—11. Undehiscent fruit with bracteoles on pedicel; calyx lobes acute.—12. Fruit; sectioned to show maturing ovules on globose placenta and the vestigial crescentlike septum.

Stylidium expeditionis is a member of the section *Squamosae* of Mildbraed (1908). Although not clearly more nearly related to one particular species of this section than others, it may be compared to *S. caricifolium* Lindl. However, *S. caricifolium*, including its three subspecies (Carlquist, 1969) forms caespitose, much-branched tufted plants, as do most species of the section *Squamosae*. *Stylidium expeditionis* is unique in the section, to the best of my knowledge, in invariably producing a single shoot per plant each year without branching. Old plants therefore have elongate stems from which adventitious roots grow down to the soil. Adventitious roots are a characteristic feature of *Stylidium* species, probably because vascular bundles lack secondary growth, and formation of adventitious roots probably occurs for much the same reasons as in monocotyledons, which also lack secondary growth in vascular bundles. One can assume that as the unbranched stem of *S. expeditionis* elongates over a number of years, eventually the height of the leaf rosette attains a position untenably high for growth of adventitious roots from the rosette to the soil surface, and either for lack of water supply or support by the roots, or both, the plant eventually declines. Leaves of *S. expeditionis* are much shorter and narrower than those of *S. caricifolium*, are obtuse, and are bisulcate on both surfaces. This last feature is unique within the section *Squamosae*. The scale-leaves, like the leaves, are short compared to those of other species of *Squamosae*.

Calyx lobes of *S. expeditionis* are narrower than those of *S. caricifolium*. Corolla size and size and shape of corolla lobes are good species criteria within the section *Squamosae* (Carlquist, 1969). The corolla of *S. expeditionis* is distinctive in its subequal spatulate lobes, the upper two of which overlap in a reverse hooded fashion (Fig. 14). The column is short and anthers are small compared to those of *S. caricifolium* (column: ca. 1 cm long; anthers ca. 1 mm long). The throat appendages of *S. expeditionis* are notable for section *Squamosae* for their small size and for being rose-tipped; the largest pair look winglike (Fig. 19). Capsules are smaller and more spherical in *S. expeditionis* than in *S. caricifolium*.

Stylidium expeditionis could be compared with other species of *Squamosae* to demonstrate numerous differences between *S. expeditionis* and any of the other species; *S. caricifolium* has been used in the above discussion largely because the two species might be confused if viewed superficially.

Stylidium ricae Carlquist, spec. nov.

FIGS. 22-30

Perennis glabra, caudice dense caespitoso, breve, crasso. Folia radicalia, anguste oblanceolata, ca. 10 (7-11) cm longa, ad 3 mm lata, petiolata, lamina nonsucculenta, plana, papillosa et concava supra, acuta. Scapi ca. 22 (15-30) cm longi. Scapus basi

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Fig. 13-16. *Stylidium expeditionis* (Carlquist 5960).—13. Habit of plant in flower (flowers visible at upper left).—14. Flower; face view to show shape and disposition of corolla lobes; column in triggered position.—15. Portion of leaf and leaf tip; abaxial surface of tip, adaxial surface of portion (right) shown.—16. Same leaves as in Fig. 15, reversed so that abaxial surface of the leaf portion (left) and adaxial surface of the leaf tip are shown.

roseus, distaliter simplex (ramuli uniflori), proximaliter 0-3 ramulis instructus, his 2-3 flores ferentes, noncorymboses. Bracteae anguste lineares. Scapus glanduloso-hirsutus distaliter. Flores sessiles. Calycis tubus pilis glanduligeris dense instructus, elongatus, teretis, 7-15 mm longus; lobi glabri, anguste acuti, ca. 1.5 mm longi. Corollae tubus lobo calycino aequans vel brevior; laciniae aequales, oblongo-rotundatae, roseae supra, roseae et glandulosae infra, ca. 2 mm longae, 1.5 mm latae. Faux nuda. Labellum miniatum, obtusum, basi appendiculis triangularis instructum. Columna pilis clavatis et vesiculosus ad apice instructa; antherae atrobrunneae. Capsula fere linearis, 1.5-2 cm longa.

Perennial glabrous in vegetative portions, the stems densely grouped in a caespitose fashion, never giving rise to proliferations as offshoots with elongate stems as in *S. macrocarpum*, very thick and short (as long as wide), tightly rooted in rock crevices. Leaves basal, narrowly oblanceolate, 10 (7-10) cm long, up to 3 mm wide, not succulent but flat, petiolate, the upper surface of the lamina concave and with globose-papillate epidermal cells; leaf tip acute. Scape about 22 (15-30) cm long, tinged rose in lowermost portions but otherwise green, simple (the branches one-flowered pedicel-like) above, with 0-3 branches below bearing 2-3 flowers at most in a cymose fashion. Scape monoaxial, never corymbose or subdivaricately branched. Bracts narrowly linear. Scape hirsute in upper portions. Flowers sessile (the upper on pedicel-like bracteole-bearing one-flowered branches such as have been termed pedicels usually in Stylidiaceae). Calyx tube densely glandular-pubescent, terete, 7-15 mm long at anthesis. Calyx lobes glabrous, narrowly acute, 1.5 mm long, rose above, rose and glandular below. Corolla tube the same length as calyx lobes or shorter, lobes of the same size, paired laterally, roundish-oblong, 2 mm long, 1.5 mm wide. Throat bare. Labellum minute, obtuse, provided with triangular appendages at the base. Column with clavate vesicular hairs at tip, anthers dark brown. Capsule linear, 1.5-2 cm long.

Synonym.—*Stylidium macrocarpum* (Benth.) Erickson & Willis var. *planifolium* Erickson & Willis, *Victoria Naturalist* 72: 135, 1956.

Holotype.—Although Erickson and Willis (1956) differentiated between holotypes and isotypes for the entities they named, with the holotypes located at MEL, by clerical error they did not do so for *S. macrocarpum* var. *planifolium*. Their citation reads, "TYPE from stony slopes near Billerango Hills, SW of Morawa, Western Australia (ISOTYPES in MEL, K, and PERTH—*Rica* Erickson, 10 Sept. 1953)." In accord with the intent of these authors, I designate the holotype of *S. macrocarpum* var. *planifolium*, and therefore for *S. rica*, to be the MEL specimen.

Figs. 17-21. *Stylidium expeditionis* (Carlquist 5960). Flower and portions thereof.—17. Flower; side view to illustrate calyx lobes; column in reposing stage.—18. Opening flower with anthers in preanthesis position, unopened.—19. Center of flower, face view. Column poised; throat teeth clearly visible.—20. Center of flower, side view; column in reposing stage; note knob above anthers at column apex.—21. Side view of flower to show the downward-pointing labellum (upper right) with its two erect appendages.

Additional collection.—In crevices of granitic outcrop, with *Stylidium petiolare* Sond., *S. repens* R. Br., *Drosera leucoblasta* Benth., *Melaleuca urceolaris* F. Muell., *Trachymene*, and *Dichopogon*, about 3 mi N of Coal Seam National Park on Coal Seam Road northward to Mullewa, Western Australia. August 27, 1974, *Carlquist 5439* (RSA, PERTH, CANB, MEL, US, GH, NSW, K, MO).

From a single dried specimen, one might easily consider *S. ricae* merely a variant of *S. macrocarpum*. However, observations on living material and a series of dried specimens show it to be an amply distinct species with nearly as many resemblances to *S. pycnostachyum* Lindl. or *S. divaricatum* Sond. as to *S. macrocarpum* (Benth.) Erickson & Willis. The geographical and ecological occurrences of these species are also distinct from one another.

Stylidium macrocarpum is a sand heath species that extends from the Murchison River area southward to Albany (Erickson, 1958), and is most abundant in the sandplain between Geraldton and Gingin. *Stylidium pycnostachyum* grows in hardpacked soil of granitic hills near Jurien Bay and in the Darling Range (Erickson, 1958, and original observations). *Stylidium ricae* occurs in a small area of granitic outcrops (the type locality and my collection are in much the same area), where it is a rock-crevice plant.

In habit, *S. ricae* forms dense clumps composed of numerous short, thick stems very difficult to extract from rock crevices without digging tools—a habit quite unlike that of *S. macrocarpum*, which has stems simple or branched only a few times (often by means of elongate stems), and which never forms clumps and is therefore easily uprooted from sand. The leaves of *S. ricae* are exceptionally long, oblanceolate, flat, somewhat concave above with globosely papillate cells on the upper surface. Leaves of *S. macrocarpum*, on the contrary, are shorter, terete, succulent, and have short callous margins near the tips. Leaves of *S. divaricatum* are like those of *S. macrocarpum*. Leaves of *S. pycnostachyum* are broad, obovate, and densely hirsute.

The scapes of *S. ricae* are more reminiscent of those of *S. pycnostachyum* or even *S. tenuicarpum* Carlquist than those of *S. macrocarpum*. Scapes of *S. macrocarpum* are subdivaricately branched into complex corymbose portions composed of cymes. In *S. ricae*, a maximum of three lowermost branches (often none) are branched, and bear a maximum of three flowers per branch in cymose fashion. Otherwise, the inflorescence would be termed a raceme, for it is clearly monoaxial and the flowers are borne singly on what may be termed branches but have traditionally been termed pedicels (Mildbraed, 1908; Erickson, 1958) despite the presence of bracteoles. Thus, the inflorescence of *S. ricae* very closely approaches the “raceme” type. The inflorescence axis upper portions and the ovaries (“calyx tubes”) of *S. ricae* are densely glandular, like those of *S. pycnostachyum*, whereas

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Figs. 22–25. *Stylidium ricae* (Carlquist 5439).—22. Habit. 23. Leaf tips: adaxial surface, left; abaxial surface, right.—24. Base of plant, showing the short stem covered with fibrous remnants of old leaves.—25. Portion of scape, showing lack of pubescence in lower scape portion.

those of *S. macrocarpum* are much more sparsely glandular. The scape of *S. pycnostachyum* bears bracts scattered along its length, including the portion below the lowermost flowers, whereas in *S. ricae* and *S. macrocarpum*, bracts and bracteoles occur subtending branches and flowers only. Calyx lobes of *S. ricae* are narrow and acuminate, whereas those of *S. macrocarpum* and *S. pycnostachyum* are obtuse. Corolla lobes of *S. ricae* are pale rose above, deeper rose (and glandular) below, whereas those of *S. macrocarpum* are white, streaked red-brown below and those of *S. pycnostachyum* are white, streaked pink below. Corolla-lobe shape in *S. ricae* differs somewhat from that of *S. macrocarpum*, as comparison of my Fig. 29 with figures of Erickson (1958) for *S. macrocarpum* will show. The labellum of *S. ricae* is like that of *S. macrocarpum*.

Thus, an appreciable assemblage of features differentiates *S. ricae* from its closest relatives. Examination of living plants or dried specimens of *S. divaricatum* demonstrates less similarity to *S. ricae* than the similarity between *S. macrocarpum* and *S. ricae*. If *S. ricae* were not to be recognized, many other *Stylidium* species would have to be reduced to infraspecific status also. Because Mrs. Rica Erickson originally discovered this plant and because her work has in large measure stimulated my interest in Stylidiaceae, I take pleasure in naming the species for her. In naming this species for her, I must use her given name, for Willis has commemorated her with *S. ericksonae* J. H. Willis, a species from Northern Territory. The varietal name given *S. ricae* by Erickson and Willis (1956) cannot be used at the rank of species, for there is already a *S. planifolium* Poir.

The three species described in this paper reveal no remarkable new features for the genus *Stylidium*, but they do add dimension to the picture of *Stylidium* as a genus which has responded to "insular" distribution of soil and rock types in southwestern Australia by a remarkable speciation, a speciation that has featured prominently what may be termed vicarious species.

NOTES ON PREVIOUSLY DESCRIBED *STYLIDIUM* SPECIES

STYLIDIUM AEONIOIDES Carlquist. In 1969, I described this species from Cadda Road, near Badgingarra. During my 1974 field work, I located a population in an ecologically similar site: in sandy pockets of an ironstone rise, on the first hill north of Cockleshell Gully on the road toward Greenhead (October 4, Carlquist 5923, RSA and other herbaria). In this locality, all plants were

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Figs. 26–30. *Stylidium ricae* (Carlquist 5439). Views of flowers.—26. Flower from lower portion of scape; column in poised position, ovary with bracteole at base (a second flower in bud to right), and bract at base of pedicel.—27. Side view of flower, illustrating glandular nature of ovary ("calyx tube"), acute nature of calyx lobes, and the triangular labellum with two small pointed lateral appendages.—28. Oblique view of flower; column has stigma developed, anthers withered; labellum to right of column base.—29. Face view of flower to portray form of corolla lobes.—30. Bud opening; anthers unopened.

white flowered, whereas plants at the type locality were yellow flowered (Carlquist, 1969).

STYLIDIUM HUMPHREYSII Carlquist. I described *S. humphreysii* in 1969 on the basis of a specimen given to me by Mr. Fred W. Humphreys shortly before his death. Although he mentioned that it came from near Laverton, he died before communicating additional details to me. Mrs. Evelyn Humphreys (personal communication) has seen it near Laverton recently. In 1974, I spent the month of July in inland portions of Western Australia, thanks to Mr. Alex George and Mr. Kevin Richards, who kindly invited me to participate in this trip. At three localities, I found populations on red desert sands. These localities are as follows: 212 mi N of Rawlinna, on road to Neale Junction (July 16, *Carlquist 5152*, RSA); 231 mi N of Rawlinna, on road to Neale Junction (July 16, *Carlquist 5153*, RSA); and 128 mi W of Warburton, on road to Laverton (July 28, *Carlquist 5190*, RSA). At all localities, plants were sterile or in bud at this season, but readily identifiable as *S. humphreysii*. This species is undoubtedly present in large numbers at scattered localities in the interior of Western Australia. It tends to occupy stable flats of red sand on which spinifex grasses, *Thryptomene* (Myrtaceae), and such associates as *Brachysema chambersii* (F. Muell.) Benth. or *Stylidium induratum* Scott can be found.

STYLIDIUM INSENSITIVUM Carlquist. My type material for this species came from a swamp covered by stunted paperbark trees near Mt. Merivale, but I also found this species near Cranbrook. I observed and illustrated what appeared to be small beetles visiting flowers at the Cranbrook locality (Carlquist, 1969). Revisiting the type locality in 1974, I observed flowers characteristically visited by minute flies, much smaller than those that visit *Stylidium* species with sensitive columns. I prepared photographs of this fly, which will be published elsewhere. Meanwhile, I would like to augment my description of this species. In the throat of the corolla are four yellowish spots. These may function as false nectar lures for nectarivorous insects. The shiny knobs in corolla throats of various *Stylidium* species and the shiny disc in the center of the labellum in most *Stylidium* species almost certainly serve as false nectar lures.

STYLIDIUM INVERSIFLORUM Carlquist. This distinctive species, also described from Cadda Road (Carlquist, 1969), was found in 1974 on the Watheroo West road, 2 miles east of the Badgingarra—Eneabba Highway, where it occurred in abundance in bare sand areas at roadsides in company with *S. crossocephalum* F. Muell. (no collection), and at the Cockleshell locality cited above for *S. aeonioides* (October 4, *Carlquist 5924*, RSA). Although completely different from *S. diuroides* Lindl. in floral features, vegetatively the two species are similar, although distinguishable. *Stylidium diuroides* also occurs at the Cockleshell Gully locality.

STYLIDIUM SQUAMOSOTUBEROSUM Carlquist. Field observations made in 1974 reinforce the confidence with which I described this species in 1969. *Stylidium squamosotuberosum* is indeed always restricted to very wet swampy areas of the south coast, such as those where one may find *Cephalotus*. I

found *S. squamosotuberosum* in a swamp two miles west of King River on the Mt. Many peaks road (Sept. 18, *Carlquist* 5674, RSA; same locality, October 16, *Carlquist* 6045, RSA). At this locality, its rose flowers appeared to mimic those of the *Polypompholyx multifida* F. Muell. with which it grows, and it may share the same pollinating insect. I also found it in 1974 in a *Leptocarpus* swamp two miles north of Windy Harbor, on the Northcliffe—Windy Harbor road (October 18, *Carlquist* 6070). At this locality, large plants were present, and study of these revealed that adult plants indeed do, as I stated in 1969, lack a basal rosette of leaves and thereby resemble the restiads with which they grow, an interesting example of parallel evolution.

Other observations.—In my 1969 paper, I calculated the number of valid species of *Stylidium* as 137; I neglected to include in this figure *S. coroniforme* Erickson & Willis and *S. fluminense* Erickson & Willis (Erickson and Willis, 1966). Adding these and the three described above, the total becomes 142. Dr. Sidney James (University of Western Australia) has found that *S. elongatum* Benth. and *S. crassifolium* R. Br. differ in level of polyploidy, and he is of the opinion that the two species should be maintained (personal communication). I reduced *S. elongatum* to a subspecies of *S. crassifolium* (1969). A case might still be made that a population differing by virtue of polyploidy as well as minor morphological differences and geographical distribution could be regarded as a subspecies, as has been done in other genera. Certainly the two entities are very similar to each other morphologically, whereas other species of *Stylidium* differ from nearest relatives by a series of well-marked characters. If, however, one chooses to retain *S. elongatum* as a species, the total number of species for *Stylidium* considered valid would become 143. New species are to be expected, especially in northern areas of Australia. Of interest within *Stylidium*, however, is not the precise number of valid species but the modes of speciation (about 100 spp. are endemic to southwestern Australia) in this remarkable genus.

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