
SANIELLA AND ITS RELATION TO OTHER SOUTH AFRICAN GENERA OF *HYPOXIDACEAE*

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A re-examination of the status of the monotypic genus *Saniella* Hilliard & Burt (Hypoxidaceae) was inspired by the rediscovery of *Empodium occidentale* on Hantam Mountain in Calvinia Division, SW Cape. This plant does not belong to *Empodium*, and has critical features that show that it is better placed as a second species of *Saniella*, but at the same time it lessens the gap between *Saniella* and *Spiloxene*. It is concluded that the whole question of the interrelations of *Saniella*, *Spiloxene* and *Pauridia* needs to be studied in depth. In the interim these three genera should all be maintained. *Empodium occidentale* is accordingly transferred to *Saniella*.

Keywords. New combinations, South African flora.

Saniella was described as a new monotypic genus of *Hypoxidaceae* found on either side of the South Africa – Lesotho border at the top of the Drakensberg escarpment (Hilliard & Burt, 1978: 70). It was differentiated from *Spiloxene* Salisb. by having a long ovary beak, which permits the ovary itself to remain below the surface of the soil, by the tepals being united at the base into a shallow cup and by the anthers (as seen in transverse section) being different in back and front view (they are dorsoventrally asymmetrical – see Hilliard & Burt, 1978: fig. 4A). In *Spiloxene* s. str. there is no ovary beak, the tepals are quite free from one another and the anthers are the same in front and back view (dorsoventrally symmetrical).

Saniella was found well outside the known range of *Spiloxene* which is confined to the south-western and southern Cape. Nevertheless it was known that there were some ‘difficult’ plants in the Sutherland division of the south-western Cape currently passing as *Spiloxene*. A specimen of the proposed new genus was sent to a botanist at Stellenbosch (the late Miss M.F. Thompson) who was known to be studying *Spiloxene*. She took the view that the Sutherland plants were not closely related: publication of *Saniella* accordingly went ahead and there the matter rested.

In 1989 Dr Auriol Batten collected on the summit plateau of Hantam Mountain in Calvinia division of the SW Cape, and she found there sheets of an Hypoxidaceous plant that she was unable to place. The specimens and sketches that she sent me turned my mind back to *Saniella*. There was a striking resemblance because the Hantam plant had two of the salient features of *Saniella*, a long ovary beak and the tepals united into a short bowl at the base. Some years previously I had been interested in the Natal species of another genus of *Hypoxidaceae*, *Empodium* Salisb., and I had found that although *Empodium* had been accepted as the correct name for the

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genus *Forbesia* (Nel, 1914b) most of the species that Nel had recognized had not been transferred to it. I made these transfers (in Hilliard & Burtt, 1973) and among them was *Empodium occidentale* (Nel) B.L. Burtt, collected on Hantam by Hans Meyer, a German doctor who lived nearby.

It soon became clear that Nel had referred this plant to *Empodium* (his *Forbesia*) largely on account of its long ovary beak; in having white (not yellow) flowers, and V-shaped (not plicate) leaves it is ill-placed in *Empodium*. This was clearly Dr Batten's plant and her sketches included a transverse section of the ovary, showing it to be trilobular with axile placentation (it is unilocular with parietal placentation in other species of *Empodium*), and also that there was a bract at the junction of peduncle and pedicel (there is no bract in *Empodium*).

Thus the position was reached that Dr Batten's plant could be identified with *Empodium occidentale*, but that the plant was not correctly placed in *Empodium* and might well represent a second species of *Saniella*.

In the 10-year period between the description of *Saniella* and the investigation of Dr Batten's plant from Hantam Miss M.F. Thompson (Mrs Rand) had sadly died. Mr Oliver at Stellenbosch kindly sent on loan the relevant material that Miss Thompson had been studying and comparable material was also received on loan from the Compton Herbarium, Kirstenbosch (NBG). These loans showed that there were several collections of the Hantam plant under *Spiloxene* (marked n. sp.) and other material from Sutherland and nearby that seem to be the same, as well as a few other sheets that are clearly closely related but perhaps represent a distinct species. Miss Thompson had pencilled a manuscript epithet on these.

The question of generic limits in Hypoxidaceae has always been difficult, and now obviously needs a thorough study. It had been hoped to undertake this, but unfortunately it has not been possible, nor can an opportunity for it be foreseen. Pending such a thorough study an interim course of action must be proposed. The present paper will fall into four sections: I, a comparison of *Empodium occidentale* with *Saniella*; II, a comparison of *Saniella* with typical *Spiloxene*; III, a survey of the characters of *Spiloxene* sens. lat. (that is, the genus as currently understood), and a comparison of *Saniella* with these, and IV, consideration of the other seemingly related genus, *Pauridia* Harv. The conclusions from these four components of the study lead to the course of action finally proposed.

First, however, there are two items in the original description of *Saniella* that need comment. One is a straightforward omission: no reference was made to a bract, but one is present: a single linear submembranous bract arises just below the ovary and is about 12mm long. The second item concerns the description of the underground parts; this we referred to as vertical fleshy caudex with fleshy contractile roots, passing upwards into an underground pseudostem formed by the membranous sheaths of the aerial leaves. Further examination of the 'fleshy caudex' shows that though cylindrical in shape (at least when the plants are in flower in early spring) there is no essential difference between it and the naked corm, or tuber, of *Spiloxene aquatica*. It may be noted that both *Saniella* and *Spiloxene aquatica* are plants of very wet places and this is probably linked to their lack of corm-tunics.

I. *EMPODIUM OCCIDENTALE* AND *SANIELLA*

The underground parts provide one of the most obvious differences between *Empodium occidentale* and *Saniella*. The lack of a fibrous corm tunic in *Saniella* has just been mentioned and its likeness to *Spiloxene aquatica* in this feature is clear. *Empodium occidentale*, on the other hand, has a very well-developed fibrous tunic. Nel (1914a) used corm tunics to classify the species of *Spiloxene* into seven groups. *E. occidentale* clearly has a tunic that is reticulate but remains attached to the ring (Nel calls it the *asserculum*) at the base of the corm. This is the pattern of Nel's group *Flaccidae* which consists of the three species *S. trifurcillata* (Nel) Garside, *S. declinata* (Nel) Garside and *S. flaccida* (Nel) Garside. Whether the lack of tunic in *Saniella verna* is derived from this pattern it is, of course, impossible to tell.

Features of inflorescence and flower in which *Empodium occidentale* and *Saniella* agree are the flowers solitary in the leaf axils, a solitary bract, a well-developed ovary beak, the ovary itself being borne at or very near soil level, the tepals united for about 2–3mm at the base forming a short bowl-shaped perigone 'tube', the anthers are dorsiventrally asymmetric (Hilliard & Burt, 1978: fig. 4A), and the ovary in both is trilocular. There is a slight difference in style and stigma: in *Empodium occidentale* the style is very short, the stigmas about 8mm long, whereas in *Saniella* the 3–6.5mm style is longer than the stigmas (2–3.5mm). (The stigmas in the plants under consideration vary from free and spreading to permanently more or less fused so that the only stigmatic surface that is exposed is formed by the margins of the stigmas. There may be features of taxonomic importance here, but it is not a character that can be used in the herbarium, being affected by time of collecting and pressure in drying.) In neither species does the peduncle elongate after flowering, so that the fruits remain at or near the soil surface; when ripe they break up irregularly. The seeds are black and have a mamillate coat, but there is one striking difference between the two: in *Empodium occidentale* there are short brown hairs arising between the mamillae, but *Saniella verna* is glabrous (see Fig. 2).

These data, in my view, provide more significant resemblances than differences between these two plants. I conclude that they should be placed in the same genus. For subsequent comparisons, therefore, *Saniella* will be considered as comprising these two species and its generic characters will be extended accordingly.

II. *SPILOXENE* SENS. STRICT. AND *SANIELLA*

The type species of *Spiloxene* is *S. capensis* (L.) Garside (previously more generally known as *Hypoxis stellata* L. fil.). Like *Empodium occidentale* it has a well-developed fibrous corm tunic, but in *S. capensis* the basal tips of the reticulating fibres are pungent and free (Thompson, 1976; Fig. 2C, CA), whereas in *E. occidentale* they are joined to the continuous ring at the edge of the basal plate (Nel calls this an 'asserculum' in Latin, 'Leiste' in German; Thompson refers to this structure as a 'ridge'). Both *Spiloxene capensis* and *Saniella* have carinate leaves (Thompson, 1976: fig. 6A,C; Hilliard & Burt,

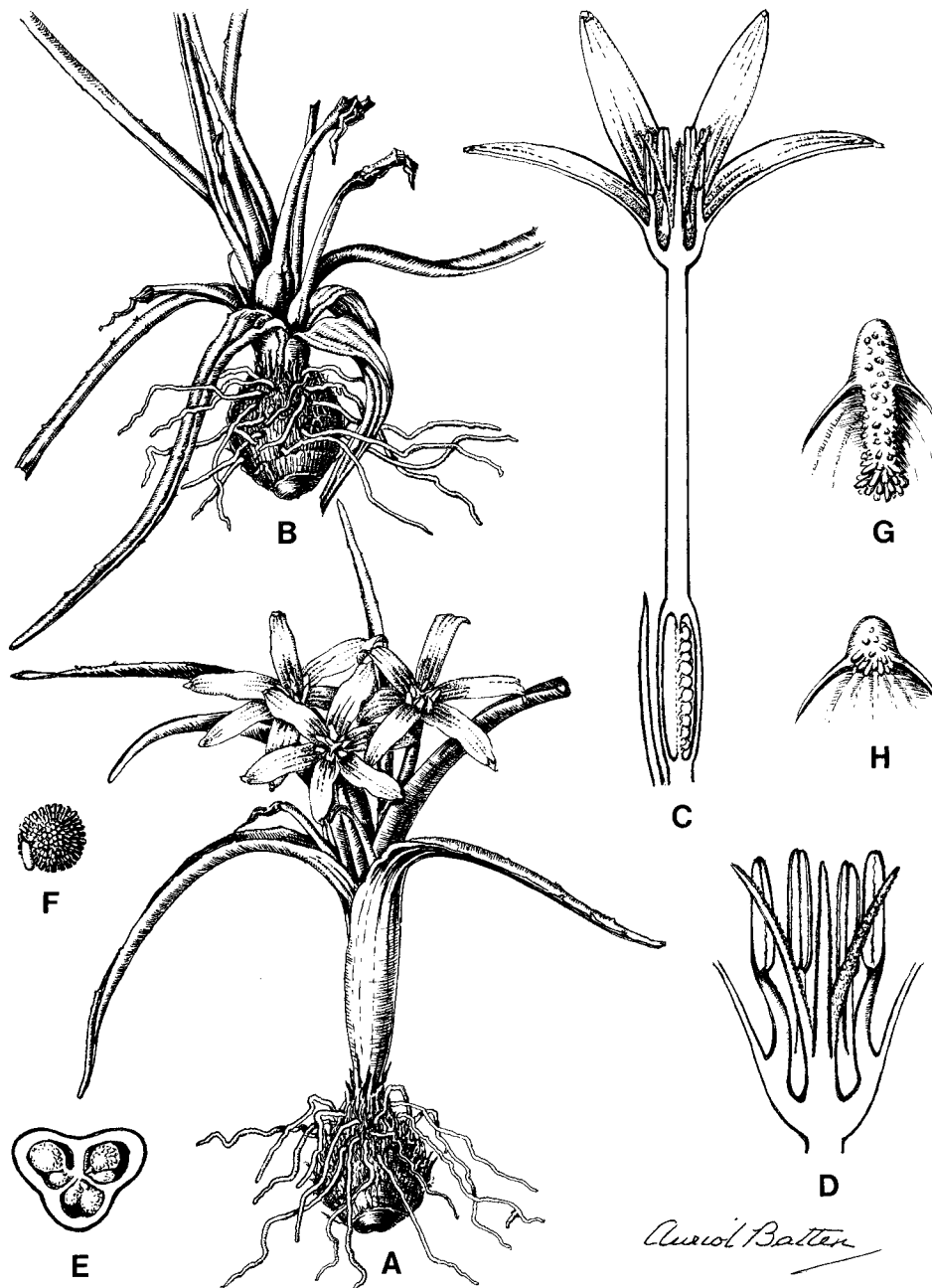


FIG. 1. *Saniella occidentalis* (Nel) B.L. Burtt. A, flowering plant, $\times 1$; B, fruiting plant, $\times 1$; C, vertical section of flower with bract, $\times 2$; D, base of perigone to show bowl-shaped tube and arrangement of stamens and stigmas, $\times 4$; E, transverse section of fertilized ovary, $\times 3$; F, seed, $\times 10$ (cf. Fig. 2); G,H, tips of outer (G) and inner (H) segments from inside, $\times 20$.

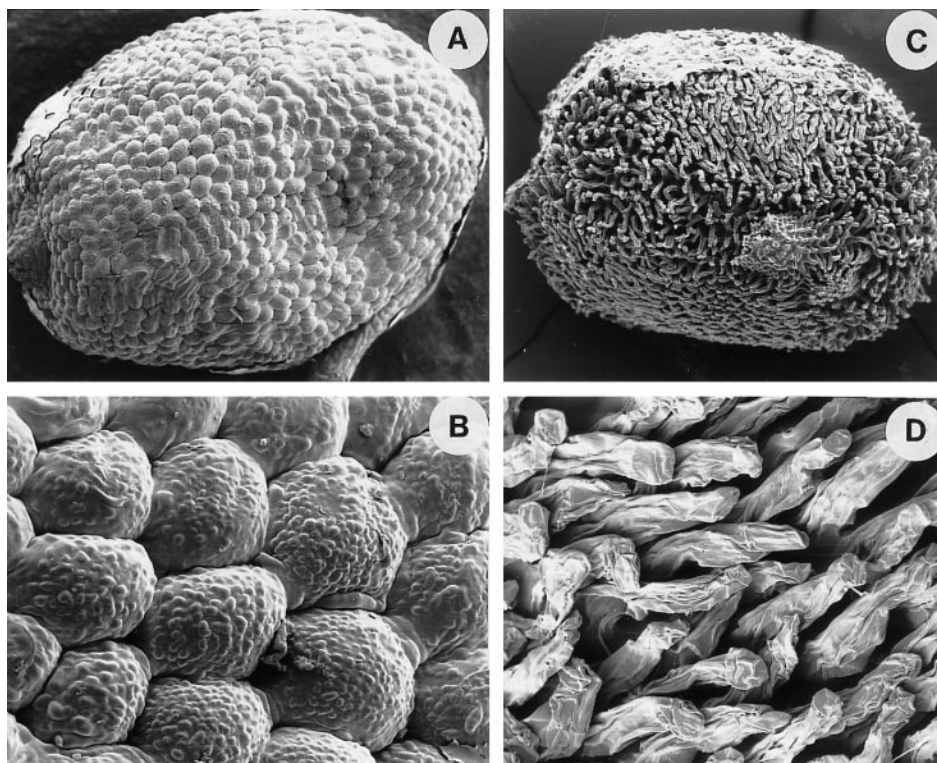


FIG. 2. SEMs of *Saniella* seeds. A,B, *S. verna*; C,D, *S. occidentalis*. A,C $\times 80$; B,D, $\times 500$.

1978; Fig. 2F), with mucilage canals above the vascular bundles. The keel is rather more sharply defined in *Spiloxene capensis* than in *Saniella*. In *Sp. capensis* the tepals are acute at the apex and free to the base, in *Saniella* they are blunt at the tips and shortly united at the base into a bowl-shaped 'tube'. Anthers are symmetric in *Sp. capensis*, asymmetric in *Saniella*. The ovary of *Sp. capensis* is flat-topped without any beak; in *Saniella* it is sharply narrowed into a long beak. The fruit in *Sp. capensis* is circumscissile just below the perianth, and contains black glabrous mamillate seeds. In *Saniella* the fruit disintegrates irregularly: the seeds are mamillate and glabrous in *Saniella verna*, but hairy in *Empodium occidentale*.

The conclusion drawn from this comparison of *Saniella* with the type species only of *Spiloxene* is that the two genera should be kept distinct.

III. SPILOXENE SENS. LAT. AND SANIELLA

Genera cannot be characterized solely by their type species. A summary description of *Spiloxene* s. lat. (that is as currently accepted) shows variation in many of the characters listed above as providing differences between *Spiloxene* sens. strict. and *Saniella*.

Nel arranged the twenty species that he recognized in seven groups based on the structure of the corm tunics (Nel, 1914a: 257 sub *Forbesia*). The naked corm of *Saniella verna* would find its place in Nel's group *Aquaticae*: the pattern of the corm fibres in *Empodium occidentale* would place it in group *Flaccidae*. *Saniella* agrees with *Spiloxene* sens. strict. in having carinate leaves (Thompson, 1976: fig. 6A,C). This is the commonest form in the genus, but Thompson also recognized a canaliculate pattern (Thompson, 1976: fig. 6D) and a terete leaf (Thompson, 1976: fig. B,D).

Flowers in *Spiloxene* sens. lat. may be solitary, paired or up to seven in an 'umbel-like' raceme' (Thompson, 1978: 429) and bracteoles may be one or two, foliaceous or setaceous. Although there are no flowers with long ovarial beaks, permitting the ovaries to remain at ground level, a short beak is formed above the aerial ovary of *Spiloxene alba* (Thunb.) Fourcade. This species also has *Saniella*-like asymmetric anthers.

The addition of *Saniella* to *Spiloxene* would require expansion of the generic description only to the extent of adding the basal union of the tepals and the presence of a long ovary beak in these two species. However these two characters can still be used to distinguish *Saniella*.

IV. THE STATUS OF *PAURIDIA* HARV.

This little genus (until Miss Thompson (1972) described *P. tubiflora*, it had remained monotypic for over 130 years) has been accepted by Prof. M. de Vos (1949) and by Miss Thompson (1979) as a close relative of *Spiloxene*. Miss Thompson's study of floral anatomy has thrown interesting light on this relationship. *Pauridia* has been usually distinguished in *Hypoxidaceae* by having only 3 fertile stamens. This character has been backed up by the presence of three short hooked processes between the bases of the three stigmatic arms. Anatomy, however, shows that these odd looking processes have virtually the same vascular supply as the inner whorl of stamens in normal 6-stamened *Hypoxidaceae*. In other words it looks as though the development of the inner whorl of stamens in *Pauridia* has been ontogenetically delayed and that in consequence they have come under stigmatic morphogenetic influence and have developed as pseudostigmatic hooks.

Pauridia, then, has most of its characters shared with *Spiloxene* except that it has only three fertile stamens, which is a rather frail character to sustain separate generic status for *Pauridia*. This may seem to be a relatively minor taxonomic decision, but unfortunately it has considerable nomenclatural importance as *Pauridia* (Harvey, 1838) antedates *Spiloxene* Salisb. (1866).

CONCLUSIONS

Spiloxene needs a much more thorough and critical study than it has yet received. This is not to underrate the value of Miss M.F. Thompson's work, but it has to be remembered that most of the time she was dealing with only a sample of species:

the published papers were extracted from what was evidently a very good MSc thesis: had she lived she would no doubt have carried the work through on a more comprehensive scale. She herself collected *Empodium occidentale* on the Hantam summit in 1975, but she did not realize that this plant, which she put down as *Spiloxene* sp. nov. in the herbarium, was the one that Nel had wrongly described in *Empodium*. Miss Thompson also made a number of other valuable collections of allied, or conspecific, plants in Sutherland and elsewhere, but was never able to work them out. The outstanding requirement is a full analysis of all the species of *Spiloxene*: until that is done any action to implement changes in its circumscription seems premature. More field collecting will be needed, because the herbarium material that I have seen gives me no confidence that characters of fruit and seed can be adequately surveyed from the existing specimens.

The interim decision must therefore be to retain, for the time being, all three genera *Spiloxene*, *Saniella* and *Pauridia*. Even if it is eventually decided that *Saniella* is not worth retention, I very much doubt if the continued separation of *Pauridia* and *Spiloxene* will be found to be justified. The only immediate change to be made is the transfer of *Empodium occidentale* to *Saniella*, thus:

***Saniella occidentalis* (Nel) B.L. Burtt, comb. nov.**

Syn.: *Forbesia occidentalis* Nel in Bot. Jahrb. 51: 289 (1914).

Empodium occidentale (Nel) B.L. Burtt in Notes R.B.G. Edinb. 32: 313 (1973).

Type: South Africa, W. Cape, Calvinia div., Hantam Mt., 1869, Meyer s.n. (B, photo E).

Additional specimens examined. S AFRICA. W. Cape: Calvinia div., summit Hantamberg, 24 viii 1988, Batten 892 (E); ibidem, 18 viii 1975, Thompson 2345 (E, NBG); ibidem, 5100ft, 3 ix 1986, Oliver 8873 (E, NBG).

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