

## DERMATITIS OF 'POISON IVY' TYPE FROM AN INDIGENOUS SOUTH AFRICAN PLANT—*SMODINGIUM ARGUTUM* E. Mey. (Anacardiaceae)

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In South Africa it hardly seemed necessary to think of poison ivy as a cause of dermatitis. Then in 1957 I saw three members of a household with an unusual contact dermatitis. It had come on after they had trimmed a hawthorn hedge at their home in Olifantsfontein. They were cured with ACTH injections but the real cause of their dermatitis was not established. Shortly afterwards my colleague Dr. C. M. Ross saw some neighbours of my patients with a similar trouble. To him goes the credit of discovering that true American poison ivy (*Rhus radicans*) was responsible for a number of cases in the neighbourhood. Unknown to me the hawthorn hedge at my patients' house had poison ivy growing in it. In 1959 Dr. Ross's findings were published.<sup>4</sup> It appeared that the plant had been introduced in the area from the garden of some former lady tenants who were enthusiastic gardeners with gardening friends in different parts of the world. The plants were then eradicated by a Native, who had to be treated in hospital for the consequences of carrying out this task.

The story of poison ivy in South Africa seemed to be over. In October 1962, however, a doctor's wife in Pretoria, whom I had treated earlier for a dermatitis of unknown cause, had an attack brought on by the leaves of a tree in her garden. She had been kneeling at a garden bed placed at the top of a terrace. While she was putting plants into the bed, the leaves of this tree, which grew at the foot of the terrace (Fig. 1), had been in the way, and were repeatedly crushed and rubbed between her bare thighs and legs as she worked. Within half an hour an acute burning erythematous and bullous contact dermatitis set in that took several weeks to settle. The tree in

question was already in the garden when they moved into the house, and the garden itself had been laid out by an official who quite possibly had ready access to nursery stocks of indigenous plants. Her dermatitis looked exactly like poison-ivy dermatitis. Leaves from the tree responsible showed the obvious trifoliolate pattern characteristic of the well-known South African karee. The karee, like the American poison ivy, belongs to the genus *Rhus*, but I knew of no local species of *Rhus* that was toxic to the skin.

At the National Herbarium, Pretoria, where I took a sprig from the tree for identification, it was recognised at once as an indigenous species, *Smodingium argutum*. The botanists there were all aware of the dangerous dermatitis it produces. Before long it was plain that botanists, amateur gardeners, horticulturists, foresters and certain Native tribes collectively knew a great deal about the medical aspect of this woody plant, but hardly any of this store of information had become known to the medical profession or been published elsewhere. I have now tried to put together some facts about *Smodingium*, which must obviously take its place beside certain other potentially poisonous members of the family Anacardiaceae (e.g. poison ivy, poison sumac, poison oak, the cashew nut tree, and the Japanese lacquer tree).

### Historical

*Smodingium argutum* is found only in South Africa and there is no other species in the genus. It was first discovered by Johann Franz Drège in 1832 (Fig. 2). Drège (1794 - 1881) was a German who accompanied Andrew Smith on a six months' expedition from Grahamstown into Natal. They trekked up not far from the coast, and on the way there and back Drège assembled a large collection of plants, which he sent away to Germany. These were catalogued and the lists published<sup>2</sup> by Dr. E. Meyer, Professor at Königsberg, Germany, in 1843. Among them Meyer noted a new genus and species of the Anacardiaceae which he named *Smodingium argutum*. It appeared twice in Drège's



Fig. 1. *Smodingium argutum* in a Pretoria garden. This tree was responsible for the first case of 'poison ivy' dermatitis from an indigenous plant seen by the writer.



Fig. 2. Johann Franz Drège (1794 - 1881), the discoverer of *Smodingium argutum* in 1832. He collected it in Pondoland during travels with Andrew Smith. From a photograph in the possession of Miss M. D. Gunn.

collection, having been obtained both times between the Umtata and Umzimvubu rivers in Pondoland. On the forward journey in February he collected it at an altitude of 1,000 - 2,000 feet, where it was found growing in shady spots, in valleys, and by small rivers. On returning in May he again collected it, this time at an altitude of less than 1,000 feet, where it grew in a rocky valley and in gorges and thickets.

No botanical description of the new plant appears in Meyer's publication, but Sonder<sup>1</sup> in 1860 published an account of his own in *Flora Capensis*. He had seen the Drège collection and had specimens himself. A recent description<sup>3</sup> appears in E. P. Phillips' *Genera of South African Flowering Plants*. The name 'Smodingium' appears to derive from the Greek, meaning an indurated



Fig. 3. *Smodingium argutum*. Close-up showing the trifoliate leaf arrangement, and dentate edges to the leaves.

mark. It refers to the hard fruit. This fruit is winged, and is a feature that distinguishes it from the fruits of the genus *Rhus*, which are smooth. The species name 'argutum' means sharp, and indicates the toothed edges of the leaves (Fig. 3).

#### Appearance and Distribution

The plant itself varies in appearance, being sometimes no more than a woody shrub 1 or 2 feet high, and at other times growing into a tree up to 20 feet in height. It has been seen in a somewhat climbing form around other trees. The Transkei, E. Griqualand, Pondoland and Natal seem to be its predominant natural habitat, but specimens have been collected up through Zululand and

Basutoland, even as far north as Barberton in the Transvaal.

In cultivation it can be seen in botanic parks and municipal gardens in the Transvaal, and it has been distributed to private gardens by nurserymen, landscape gardeners etc., in Pretoria and Johannesburg and probably elsewhere.

#### Common Names

There is no common English or Afrikaans name for *Smodingium argutum*. Mrs. Eliovson has called it 'Rainbow Leaf' in her book on gardening, which she has illustrated with a colour photograph showing the bright autumn tints which led her to choose this name. Incidentally, American poison ivy is also known for the beautiful colours seen in the autumn leaves that give the plant its deceptive attraction.

In Natal and Pondoland it goes by a Native name which has been spelled in different ways, plainly different forms of the same word; thus *u-Tovane*, *Um-Tomvane*, *Tovane*, *Tovana*, *Ntoyani*. In Basutoland the only name I can trace is that recorded by Mme. A. Dieterlen, who collected a specimen in November 1913 on the slopes of the Leribe Mountain, near her husband's mission station. She gives the Sotho name as *Tšilabelo e kholo*.

#### Bantu Tradition

Late in 1925 Mr. Viedge, who lived near Umtata, thought it important to publicize the danger of '... the terrible *Tovana* plant of Pondoland'. To do this he wrote to Prof. R. H. Compton of Kirstenbosch, then working at Kew, who passed the matter over to Prof. S. Schonland



Fig. 4. Prof. S. Schonland (1860 - 1940). Director of the Albany Museum and Professor of Botany, Rhodes University. Professor Schonland's unpublished records on *Smodingium dermatitis* are printed here for the first time. Photograph by courtesy of Miss M. D. Gunn.

of Grahamstown (Fig. 4). Viedge wrote that a friend of his could tell them '... what the Natives of Pondoland say about the *Tovana*. *Tovana* spits poisonous spores at anyone passing or touching the leaves. It will be a case for the hospital straight away, blisters and sores breaking out all over the face, arms and hands, or other parts exposed'. Bearing its creeping habit also in mind, it is small wonder that Mr. Viedge described the plant as '... a real vegetable boa constrictor'. Professor Schonland correctly took it that *Smodingium* was the plant referred to, but he pursued the matter further through his own contacts.

Early in 1926, Professor Schonland asked Mr. G. B. D. Frazer, forester at Lusikisiki, to send specimens of *u-Tovane* to him

at Grahamstown and supply local Bantu information about it. Frazer's specimens (collection no. and date: Z 35, 16 February 1926) have been checked for me in the herbarium by Mr. M. J. Wells in 1962, and he tells me that they are undoubted examples of *Smodingium argutum*. On 19 February 1926 Frazer wrote as follows to Professor Schonland regarding its use by the Natives:

'Uses

1st. For native charm purposes.

2nd. Sticks of it made in charcoal (or charred) and the powder rubbed into cuts made by the natives on their faces and persons (for ornamental purposes) which cut they say remains black if this is done.

3rd. It forms a powerful skin irritant so much so that my native informant says that some persons even at a few yards off to windward become affected, and finally, sores breaking out over their bodies when a few leaves are bruised mixed with a particular soil and water. Resulting brew is taken internally as well as rubbed over the person.

Superstition and Charms are so mixed up with accounts of this plant that natives show unwillingness to give information about it.'

Quite clearly, the dangers of the plant were appreciated by the Pondos, even allowing for some exaggeration.

#### EARLY RECORDS

In none of the 19th century records is there any mention of the poisonous properties of *Smodingium*. In his book<sup>2</sup> of 1907 on forest flora of the Cape Dr. T. R. Sim mentions the plant, saying that it had no known uses. Mr. Wells, of the Botanic Station, Grahamstown, has further convinced me that Sim could not have known anything of its poisonous effects, since he specially points out that none of the related Cape plants produces results similar to those of the American *Rhus* species called poison ivy.

Mr. Wells has further drawn my attention to a point in an early record which I had seen but ignored. Miss Alice Pegler, A.L.S., a well-known botanist and collector of plants in the Kentani area, Transkei, noted at the beginning of this century that the sap of *Smodingium* was creamy, went brown, and was 'unpleasant'. These observations are noted both in the National Herbarium, Pretoria, and Albany Museum, Grahamstown, on her herbarium cards of *Smodingium* specimens, dating from 1903 onwards. It is hard to divine exactly what a lady 60 years ago would have regarded as 'unpleasant' about plant sap, but it seems not unlikely that she meant it was irritating to the skin.

#### Sister Stephany, O.S.F.

On a letter in the Albany Museum from 1926 regarding *Smodingium* Professor Schonland had scribbled a note: 'My first information on the poisonous nature of *Smodingium* came from Kokstad a number of years ago'. Mr. Wells in Grahamstown also found a note on a herbarium sheet of *Smodingium* in Professor Schonland's writing: 'Very poisonous, even if juice is only externally applied. See letter from Sister Stephanie, Convent, Kokstad, Nov.



Fig. 5. Sister Stephany, B.A., Order of St. Francis. The only photograph extant of the missionary-botanist who made the first records of *Smodingium* dermatitis from Kokstad in 1912. The picture, taken in 1957 and reproduced here by permission of the Order, shows Sister Stephany with a young Bantu orphan girl.

'The doctor\* then in Kokstad knew that I was teaching botany and that I am very much interested in plants with medicinal properties, so he brought me a twig and asked me to let him know the name of it. I sent the specimen to the Albany Museum for identification.

'The story the doctor told me: A Coloured man† came to him for treatment. He was very ill and his head (the words of the doctor) was badly swollen. The patient was a farm hand and related that he had eaten honey from bees which nested in a stony ridge at the foot of which a number of shrubs in full bloom were growing.‡

'A few weeks afterwards a farmer brought his children—I do not remember their number—also with swollen heads. He also brought a branch of a bush saying that the children had been playing with twigs of the bush and had rubbed their arms with the leaves.'

Sister Stephany also remembers hearing that Native witch-doctors used the plant in a brew to identify a culprit. If ill-effects were suffered, it was a sign of guilt.

\* Probably Dr. H. G. F. E. le Roux, an Edinburgh graduate of 1891, who died in 1942—G.H.F.

† Possibly Griqua—G.H.F.

‡ Presumably he had broken through the shrubs to reach the hive—G.H.F.

17th, 1912'. Unfortunately the letter was missing, but it seemed to be the earliest account of the reaction, having been noted exactly 50 years ago. Because of losses through fire in the Albany Museum, further pursuit of the matter seemed hopeless. Then by a remarkable chance I learned not only that Sister Stephany was a graduate in botany, but that she was still alive, though well on in years, and living quietly on a mission station in the Eastern Cape. I wrote to her, saying that I believed hers to have been the first written record of *Smodingium* dermatitis and wondered if she remembered anything about it. On 28 November 1962 she wrote to me, just 50 years after she had written to Schonland. She modestly states: 'Your letter was a surprise but I still remember the incident. No credit for its discovery belongs to me. I could in no way prove scientifically its properties'. Here follows the relevant section of the letter to me from Sister Stephany:

Mr. O. B. Miller

The earliest relevant record that I was able to trace myself is on a herbarium sheet in the Forestry Department, made in April 1921 by Mr. O. B. Miller, a well-known forest botanist and compiler of the Native names of plants. Of *um-Tovane* (*Smodingium argutum*) he writes, on a specimen from Mt. Ayliff: 'Has a toxic property. Several European children who were beating each other with branches of this tree swelled badly and had to lie abed for some days.'

Prof. S. Schonland

When Professor Schonland became specially interested in the matter in the period 1926-27 he collected information from various sources.

From Mr. Frazer, of Kokstad he learned: 'I was informed by Mr. Brownlee, late magistrate at Mt. Ayliff, that several of the village children were laid up in bed for 2-3 days owing to their having switched each other with branches from one of these trees.'<sup>†</sup>

In the same file R. K. Davis, of Pondoland, writes in an undated letter: 'Natives state that if the tree is touched swelling of parts of the body results accompanied by great pain. A short time ago a European lady and her 2 children gathered branches and all suffered from severe facial swellings.'

In 1925 Schonland wrote to Frazer: '. . . the whole matter is more mysterious than ever. Did you get any blisters or were you otherwise affected when you collected the plant? When it (*Smodingium*) arrived, one of my assistants soaked the specimens in water and smoothed them out on paper without any effect. I had myself previously crushed some leaves between my fingers and rolled them about—again no effect. It would be nice if you could get to the bottom of this thing and this must be done by somebody on the spot. Is there any medical man who could help? Is there any other plant in your parts with a similar reputation? . . . Are perhaps only young leaves effective?'

The Government Veterinary Officer in Umtata writes: 'The juice from leaves and sap are said to have an escharotic action and if rubbed on to the skin, especially if the person is perspiring, an intense blistering effect is produced.'

In 1927 Schonland wrote to the Chief Botanist, Pretoria, as follows: 'The plant from Umtata 6434 is not a true *Rhus*. It is *Smodingium argutum*. I have had numerous accounts of its poisonous effects and I have no reason to doubt them. Yet it seems to have effect only on certain persons. It has no effect on me. I have tried fresh material in Pondoland and fairly fresh material sent to me last year. I showed this material to about half a dozen lady students after getting negative results on my own person. I warned them against it, but of course they all tried it on their bare arm—without effect. The whole matter requires careful investigation by a competent toxicologist and chemist.'

Forestry Department

In the Forestry Department the early reference of Mr. O. B. Miller was found (see above). There is no further mention of the matter till 1935, when Mr. J. Tustin, Forester at Cedarville (Myenyani), sent in *Smodingium* from Northern Natal, saying 'The peculiarity of the tree is that if the sap from the tree comes in contact with the bare parts of a person's body the part touched breaks out in a rash'. A farmer in 1950 wrote in as follows regarding *Tovane*: 'This tree occurs in the Umkomaas valley and is reputed to give allergic persons touching it a severe rash'.

In 1953 we come across the dramatic account of an employee of the Forestry Department who suffered an

<sup>†</sup>This sounds like the same incident as that reported by Mr. O. B. Miller—G.H.F.

injury on duty from *Smodingium*. The original case record was destroyed by routine after 3 years, but the following summary by the Chief Forest Research Officer, Mr. E. K. Marsh, was available. Mr. Marsh has nothing further to add today to this account, which he wrote in July 1953.

A Native employee of this Department was engaged in clearing a bridle-path through the Gamtholo Forest in the Tonti patrol of the Kokstad Forestal District. In the course of his labours he found it necessary to chop the overhanging branches of what he termed an *um-Tomyane* tree, and while engaged on this operation, which took about 5 minutes, he was intermittently splashed with its milky sap. His companion (also a Native employee) warned him to avoid getting the sap on his skin, but he replied that while he was aware of the irritating effect of the sap of trees of this kind growing near rivers, he did not expect the same effect from one growing in the forest. As there was no water near at hand he neglected to wash the sap from his skin until he returned to his kraal some hours later.\*\* On the following day he reported ill and was found to be suffering from severe itchy swellings on his face, neck, chest, abdomen, thighs, hands and arms. As calamine lotion appeared to have no effect in reducing the swellings, he was taken to hospital, where he was admitted for treatment. He was unable to resume his duties for a period of 38 days.

The doctor who treated him reported that he had had previous experience of the vesicatory effects of the sap of *um-Tomyane* trees, in that children who had stuck branches down the necks of each other's clothing or had beaten each other with branches had been severely affected.

#### PHARMACOLOGICAL STUDIES

In the late 'twenties it was suspected that cattle had been affected by eating *Smodingium*, and the Veterinary Research Institute at Onderstepoort was asked to investigate it. Nothing was done, however, probably for the reason, as Prof. Douw G. Steyn tells me, that insufficient plant material was sent for animal feeding tests.

It was Mr. E. K. Marsh who drew Prof. J. M. Watt's attention to the effects of *Smodingium* on the skin. Professor Watt's co-worker, Dr. Maria G. Breyer-Brandwijk, investigated the bark but none of the poison-ivy principles was found in it. I have discussed this with Dr. Breyer-Brandwijk recently, and she fully agrees that these negative findings may have little significance since she had no fresh latex to test. A few years after (1957), Dr. J. Frootko brought further cases to Professor Watt's notice, and these combined findings are briefly noted in the new edition of Watt and Breyer-Brandwijk's book.<sup>6</sup> The source of their statement that the green parts of the plant have no antibiotic action could not be verified, since Dr. E. M. Osborn who did the work has since died, and her records are no longer traceable at the Sir William Dunn School of Pathology, Oxford, England, where the matter was investigated.

At present Prof. Frank L. Warren of the C.S.I.R. Natural Products Research Division, University of Natal, is planning an investigation of the active principle of *Smodingium*. In other toxic anacardiaceous plants the active principle is closely related to pentadecyl-catechol. Like other catechols it polymerizes readily to a 'melanin'. This is seen also with *Smodingium*, where the creamy sap readily turns brown or black when it escapes from the plant.

\*\*The active principle is probably insoluble in water anyway—G.H.F.

## CASE REPORTS

Beside Professor Schonland's own lack of reaction to the plant, I know of four botanists and one horticulturist who have handled *Smodingium* at intervals without ill-effects. Of those who have reacted to *Smodingium*, I know of 7 persons in Pretoria and Johannesburg, 4 of whom I have interviewed and 2 have been described to me by a dermatologist and 1 by a botanist. In these instances the cultivated plant has been responsible, and the identification of the plant has been verified in each case.

*Case 1.* This is the case of the doctor's wife described in the opening paragraphs of the present paper. This patient had had eczema from other causes in the past.

*Case 2.* On his own initiative my registrar applied some *Smodingium* sap to the wrist of a relative of his. This lady, who had recently come from Europe, reacted locally with a red stripe at the site of application for about 5 days and then developed a spreading eczema round about. Systemic and local cortisone were needed to check it, but the reaction still lasted several weeks. The patient had a mild constitutional eczema as well.

*Case 3.* This patient is a well-known horticulturist, a Fellow of the Royal Horticultural Society, and authoress of some important works on botany. She has a sensitive skin. For a year she had had a *Smodingium* in her garden and used to cut it back at times. Then suddenly she developed an attack of burning like insect stings on her upper chest. Caterpillar hairs were suspected, but the true cause remained unidentified. The incident passed by until some weeks later she had a similar experience. She woke at night with a bolt, feeling as if a wasp was stinging her in bed. She ignored it and fell asleep again. Next morning she woke with a painful swelling of the whole face—the eyes had swelled shut and blisters were scattered over the face and neck. Her general practitioner considered the possibility of herpes zoster but also suspected a contact dermatitis. Later she remembered that she had arranged some *Smodingium* branches in a vase the previous evening, and the leaves had touched her face and chest. Once the pain, swelling and burning had subsided, after the use of systemic steroids, a residual irritation persisted along with a tenderness of the skin. The whole episode, which took place in the summer of 1960, lasted 3 weeks. I did not see her at the time but heard the story 2 years later from the patient and her doctor.

*Cases 4 and 5.* These two patients, husband and wife, were seen by Dr. Jan Frootko in Johannesburg over two successive years (1956 and 1957), each time for an acute bullous contact dermatitis that came on after pruning a *Smodingium*. Dr. Frootko kindly provided a clinical photograph showing the dermatitis (Fig. 6). The reaction took several weeks to settle, and cortisone preparations were used.

*Case 6.* A senior botanist related that he was guiding a party of adult visitors through an indigenous arboretum, and mentioned that the *Smodingium* specimen there was potentially dangerous. One of the men in the party nevertheless tried it out on his face. Next day he arrived at the botanists's office with an acute dermatitis, angrily wanting to know why he had

not been warned about it. Doubtless he had the same turn of mind as Professor Schonland's lady students—had he not been warned beforehand, he would never have tried it out.

*Case 7.* A lady patient of Dr. John Cowley, Johannesburg, had repeatedly cut back a *Smodingium* that was invading her tennis court. She worked with secateurs and the leaves brushed her outer arms, causing dermatitis. She tried a drop of the sap from a cut branch on her leg with the following result. The patch first turned brown and was followed after two days by a red burning swelling with slight fever. No blisters resulted. At the time of writing, one month after, the mark is still visible. Until recently it had at times woken her suddenly at night with an unpleasant irritation. Her husband now trims the tree. He merely gets a slight swelling, like the start of a rash, but it develops no further.

## DISCUSSION

A number of points make it probable that we are dealing with an indigenous poison-ivy type of plant in *Smodingium argutum*:

1. The plant contains a self-melanizing sap suggestive of the toxic catechols present in other members of the same botanical family (Anacardiaceae).

2. As all the known toxic anacardiaceous species are immuno-chemically related in regard to their skin reactions, it seems that the South African species is also likely to be related to them in this way.

3. The dermatitis produced by *Smodingium* has all the characteristics of poison-ivy dermatitis: it is no respecter of race; it affects a high proportion of the normal population to the extent of becoming virtually a local legend; the rash is often very oedematous, with bulla formation; it recovers slowly and does not improve with simple measures; some people are initially unaffected by the sap, but may become reactive later. Evidence for all these points is presented in the text of this paper.

## SUMMARY

A historical and clinical sketch has been presented of a special variety of plant dermatitis in South Africa belonging to a type usually thought to be confined to North America and the Far East. The valuable contributions of

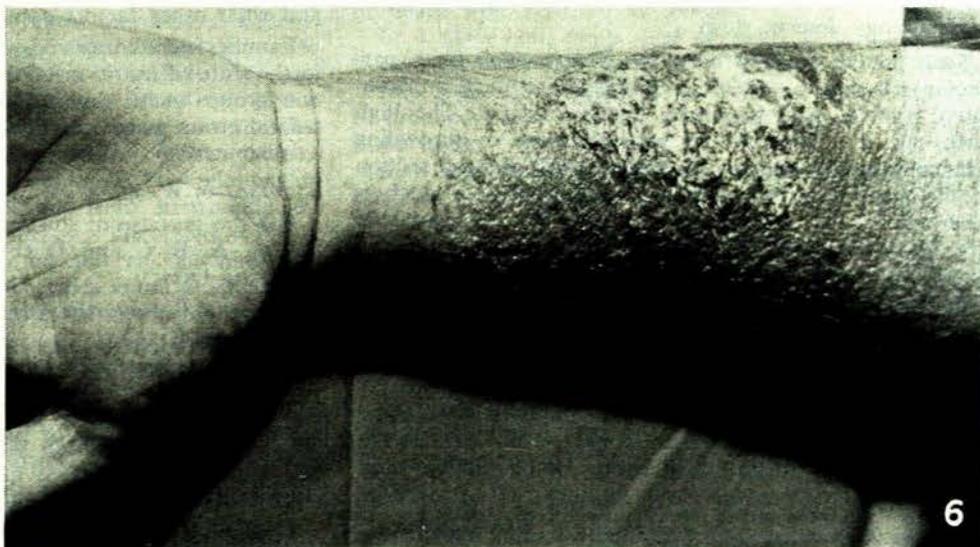


Fig. 6. *Smodingium* dermatitis. Severe vesicular and ulcerating dermatitis of the forearm stopping at the level of the glove used while pruning the tree. Photograph by courtesy of Dr. Jan Frootko.

several South African botanists to the medical aspects of the problem are given prominence. These are extracted from a large assembly of observations hitherto available only in manuscript.

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Librarian, National Herbarium, Pretoria; Mr. E. K. Marsh, Department of Forestry, Pretoria; Miss Eve Palmer, Horticulturist, Pretoria; Mr. R. J. Poynton, Department of Forestry, Pretoria; Sister Stephany, O.S.F., St. Theresa's Mission, Herschel district; Miss I. C. Verdoorn, Botanist, National Herbarium, Pretoria; Mr. M. J. Wells, Officer in Charge, Botanic Station, Grahamstown.

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