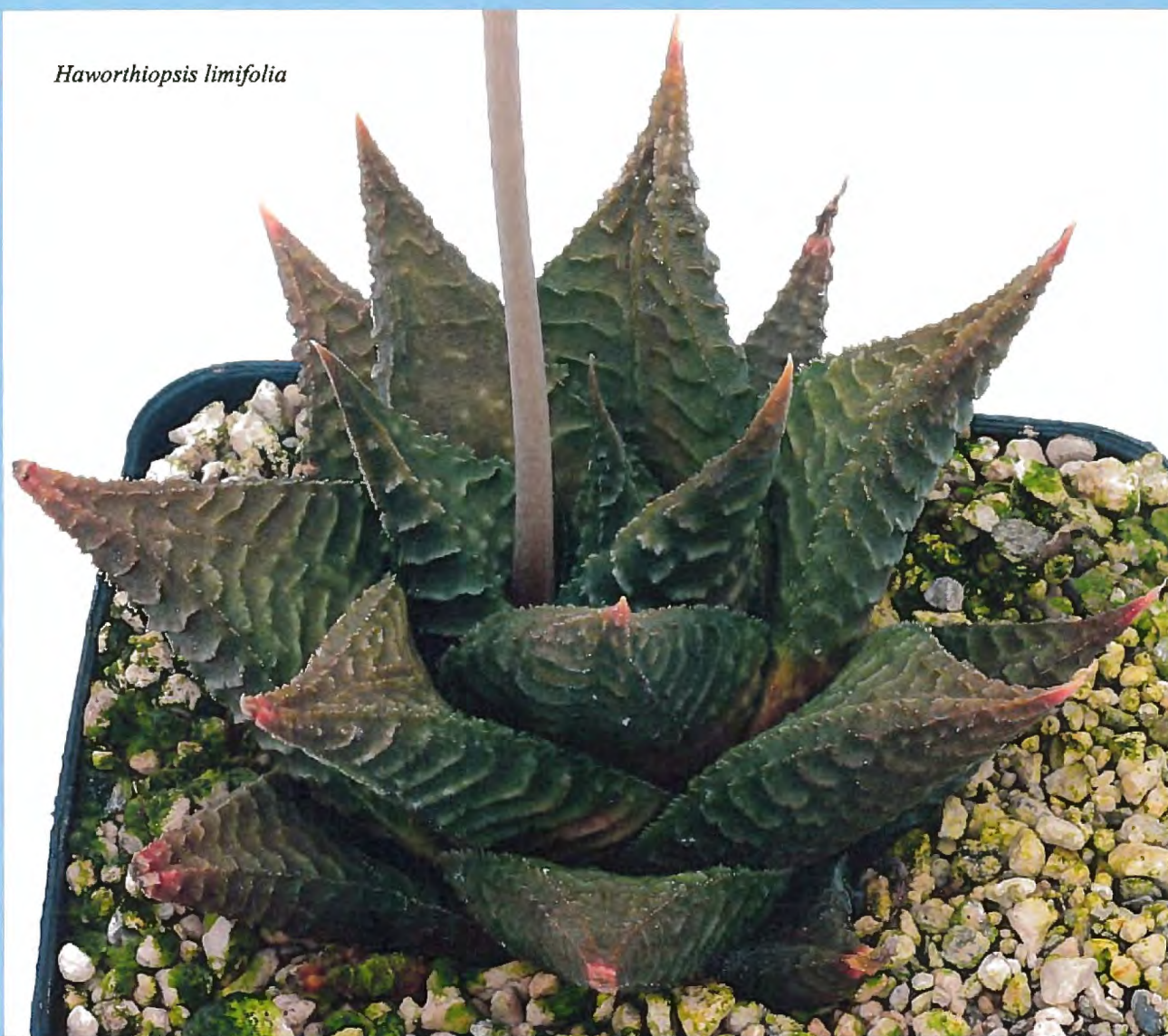


ALSTERWORTHIA INTERNATIONAL

THE SUCCULENT ASPHODELACEAE JOURNAL

Haworthiopsis limifolia



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A synoptic review and new infrageneric classification for the genus *Haworthiopsis*

(Xanthorrhoeaceae: Asphodeloideae)

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Abstract. Following on from recent DNA studies and reclassifications of *Aloe*, *Haworthia* etc *Haworthiopsis* has risen via subgenus *Hexangulares* to a genus in its own right. Unfortunately, it is not possible to reprint the article for you because copyright has been reserved for the publisher (not the authors). However a summary is permissible plus added explanatory information by the editor.

Haworthiopsis has had a similar existence to that of *Aloe* and *Haworthia* - ups and downs. It is now a genus in its own rights, species greater in number (now 18) and more widely spread. It is found not only in most parts of South Africa but also in Namibia, and Swaziland with speculation that it may also be found in Mozambique. The point is made that the new definition of *Haworthiopsis* results in not all taxa having a common ancestor. This is followed by a list of new combinations mainly for *H. reinwardtii* with a forecast of the genus prescriptions to come.

Introduction and Taxonomic History of the genus *Haworthiopsis* and its predecessors is described as complex and confused as a result of much field research and a proliferation of new names. The history details the changes over time. DNA studies by Daru et al. 2013 was a climax which brought about a new classification, the demand for which had intensified over time with Bruce Bayer being the foremost and most vociferous. Unfortunately Bayer used a new naming system which in part complied with the International Code of Nomenclature for plants and part which did not. Consequently the scientist just ignored it. The main publicity given to Bayer's classification was in the journal *Alsterworthia International* which believes that new ideas should be given publicity. The DNA studies required a new classification of *Aloe*, *Haworthia* etc. Unfortunately the bulk of the existing "classification" for *Haworthia* was made up of the unacceptable names Bayer had created. These had to go. Bayer & Manning published a revised classification (see *Alsterworthia*

International, Volume 12, Issue 1, 2012 and *Alsterworthia International* Volume 13, Issue 1 for amendments) for *Haworthia* under the title "A rationalisation of names in *Haworthia*. A list of species with new combinations and new synonyms.) in which they pleaded for scientific names to be confined to plants with DNA consistency overtime showing a relationship, a species. Divergences would depict new species. See pages 8 & 4-7. Minor differences should be given only cultivar names. See page 8. The International Code for Cultivar Names provides for habitat plants to be given cultivar names attached to scientific names.

The next (significant, revolutionary) evolutionary change to the classification was "Aloe and Goodbye: A New Evolutionary Classification of the Aloooids" by John Manning, Compton Herbarium S.A., James S. Boatwright Department of Biodiversity and Conservation Biology University of the Western Cape and Barnabas H. Daru African Centre for DNA Barcoding University of Johannesburg. Most of the species previously classified by Bayer (1976 to 1999; Bayer & Manning 2012) were under *Haworthia* sub gen. *Hexangulares* (Uitewaal 1947a: 136). The complete article can be found in *Alsterworthia International*, Volume 14, Issue 2, 2014. A list of Manning, Boatwright & Daru's 18 *Haworthiopsis* species follows:

Haworthiopsis attenuata (Haw.) G.D.Rowley,
H. bruynsii (M.B.Bayer) G.D.Rowley,
H. coarctata (Haw.) G.D.Rowley,
H. fasciata (Willd.) G.D.Rowley,
H. glauca (Baker) G.D.Rowley,
H. granulata (Marloth) G.D.Rowley,
H. koelmaniorum (Oberm. & Hardy) Boatwr. & Manning,
H. limifolia (Marloth) G.D.Rowley,
H. longiana (Poelln.) G.D.Rowley,
H. nigra (Haw.) G.D.Rowley,
H. pungens (M.B.Bayer) Boatwr. & J.C.Manning,
H. reinwardtii (Salm-Dyck) G.D.Rowley,

H. scabra (Haw.) G.D.Rowley,
H. sordida (Haw.) G.D.Rowley,
H. tessellata (Haw.) Boatwr. & J.C.Manning,
H. venosa (Lam.) G.D.Rowley,
H. viscosa (L.) G.D.Rowley,
H. woolleyi (Poelln.) G.D.Rowley

SEAN D. GILDENHUYS & RONELL R. KLOPPER state that "Haworthiopsis was established in 2013 to accommodate the species formerly classified under the subgenus Hexangulares of the genus Haworthia. This new genus is near-endemic to South Africa and found in most of the provinces of the country. It is also known from southern Namibia, Swaziland and possibly Mozambique. A total of 18 species are currently recognised in Haworthiopsis. However, this circumscription renders the genus paraphyletic with *H. koelmaniorum* sister to a polytomy comprising the rest of the Haworthiopsis taxa and Gasteria. In this contribution, seven new combinations are published (*H. fasciata* var. *browniana*, *H. reinwardtii* var. *reinwardtii* f. *chalcumensis*, *H. reinwardtii* var. *reinwardtii* f. *kaffirdriftensis*, *H. reinwardtii* var. *reinwardtii* f. *olivacea*, *H. tessellata* var. *crousii*, *H. viscosa*, *H. scabra* var. *smitii*) and two changes of status (*H. koelmaniorum* var. *mcmurtryi*, *H. viscosa* var. *variabilis*). An amplified description of the genus is provided. Six sections formerly recognised under Haworthia (subg. Hexangulares) are applied and adapted to Haworthiopsis, with some amendments. A new section, *H. sect. Koelmaniorum*, is described. New combinations for hybrid taxa in *Haworthiopsis* that were previously described as species of *Haworthia*, are given.

SEAN D. GILDENHUYS & RONELL R. KLOPPER next give a detailed account of the complex taxonomic history of the species now placed in Haworthiopsis and conclude that "To truly build a better understanding of these plants (especially at specific and intraspecific level), an enormous amount of field work is still needed (such as that of M. Bruce Bayer for *Haworthia* (sensu lato)). In addition, much remains to be learned from in-depth molecular studies. Work done thus far on the phylogeny of the aloe family has resulted in greatly changed taxonomy in this group. The use of next generation DNA sequencing techniques should be investigated to ascertain its usefulness in resolving the remaining issues.

Material and methods

This paper provides a synopsis of *Haworthiopsis* with emphasis on the sectional classification of the genus. It is based on the study of Haworthiopsis plants in the field and in cultivation over many years, as well as an in-depth analysis of literature relating to these taxa. Images of important type specimens were obtained from the JSTOR Global Plants repository [<http://plants.jstor.org>]. Herbarium acronyms follow Thiers (2015). *Haworthiopsis* (Xanthorrhoeaceae) Phytotaxa 265 (1) © 2016 Magnolia Press •

They go on to list which Haworthiopsis are found in each

South African Province, point out Haworthiopsis sections easier to delimit than in *Haworthia sensu stricto*, then refer to the phylogram published by Manning et al. (Alsterworthia International Volume 14, Issue 2, July 2011) which shows that Haworthiopsis, as currently circumscribed is not a monophyletic group and goes on to comment relationships etc which require further investigation.

Under **Taxonomic setting Haworthiopsis** SEAN GILDENHUYS & RONELL R. KLOPPER quote Rowley (2013a: 4) (See Generic Concepts in the Alooidae Part I: The Phylogenetic Story by Gordon Rowley). They quote a detailed description as

"Detailed description:—Plants dwarf, succulent perennial herbs, solitary to proliferating, acaulescent or caulescent, ca. 400 mm long. Leaves rosulate, arranged in ranks of three or five, or spirally inserted along the length of the stem, 1–350 mm long, and 6–40 mm wide near the base. Leaf surfaces viscid in some, glabrous to scabrous, tuberculate with ridges, tubercles concolorous to white, in some the upper surfaces windowed, lined and often reticulate. Margins smooth, tuberculate, ridged or with cartilaginous teeth. Inflorescences with few sterile bracts, usually racemose, rarely paniculate. Perianth < 17 mm long, bilabiate, straight or curved, hexangular or rounded hexangular at base, tapering to pedicel, white with brownish pinkish or greenish hues or nerves, 3 upper tepals of the bilabiate perianth spreading to recurved, 3 lower tepals generally strongly recurved, inner and outer tepals joined at the base, rarely fused halfway, both whorls adhering. Anthers included. Style straight, included. Fruit a capsule < 24 mm long, narrowly ovoid. Seed < 4 mm long, usually black, dark brown".

They then give an identification key for the sections of Haworthiopsis followed by the sections of Haworthiopsis recognised in this treatment and the species included in each section.

The sections of Haworthiopsis recognised in this treatment and the species included in each section.

Section	Species	Section	Species
Attenuatae	<i>H. attenuata</i>	Tessellatae	<i>H. granulata</i>
Haworthiopsis	<i>H. coarctata</i>		<i>H. tessellata</i>
	<i>H. fasciata</i>		<i>H. venosa</i>
	<i>H. glauca</i>		<i>H. woolleyi</i>
	<i>H. longiana</i>	Trifariae	<i>H. pungens</i>
	<i>H. reinwardtii</i>		<i>H. nigra</i>
Limifoliae	<i>H. limifolia</i>		<i>H. scabra</i>
Koelmaniorum	<i>H. koelmaniorum</i>		<i>H. viscosa</i>
		Virescentes	<i>H. bruynsii</i>
			<i>H. sordida</i>

GILDENHUYS & KLOPPER species following DNA results.

1. *Haworthiopsis coarctata* (Haw.) Rowley (2013a: 4)

1a. var. *coarctata*

1b. var. *adelaidensis* (Poelln.) Rowley (2013a: 4)

2. *Haworthiopsis fasciata* (Willd.) Rowley (2013a: 4)

2a. var. *fasciata*

2b. var. *browniana* (Poelln.) Gildenh. & Klopper comb. nov.

3. *Haworthiopsis glauca* (Baker) Rowley (2013a: 4)

3a. var. *glauca*

3b. var. *herrei* (Poelln.) Rowley (2013a: 4)

4. *Haworthiopsis longiana* (Poelln.) Rowley (2013a: 4)

5. *Haworthiopsis reinwardtii* (Salm-Dyck) Rowley (2013a: 5)

5a. var. *reinwardtii* f. *reinwardtii*

5b. var. *reinwardtii* f. *chalumnensis* (G.G.Sm.) Gildenh. & Klopper comb. nov.

5c. var. *reinwardtii* f. *kaffirdriftensis* (G.G.Sm.) Gildenh. & Klopper comb. nov.

5d. var. *reinwardtii* f. *olivacea* (G.G.Sm.) Gildenh. & Klopper comb. Nov

5e. var. *brevicula* (G.G.Sm.) Rowley (2013a: 5)

B. *Haworthiopsis* sect. *Attenuatae* (Pilbeam) Gildenh. & Klopper comb. Nov.

6. *Haworthiopsis attenuata* (Haw.) Rowley (2015: 2)

6a. var. *attenuata*

6b. var. *glabrata* (Salm-Dyck) Rowley (2015: 2)

6c. var. *radula* (Jacq.) Rowley (2015: 2)

C. *Haworthiopsis* sect. *Koelmaniorum* Gildenh. & Klopper sect. nov.

7. *Haworthiopsis koelmaniorum* (Oberm. &

D.S.Hardy) Boatwr. & J.C.Manning

7a. var. *koelmaniorum*

7b. var. *mcmurtryi* (C.L.Scott) Gildenh. & Klopper stat. nov.

D. *Haworthiopsis* sect. *Limifoliae* (G.G.Sm.) Gildenh. & Klopper comb. nov.

8. *Haworthiopsis limifolia* (Marl.) Rowley (2013a: 4)

8a. var. *limifolia*

8b. var. *arcana* (Gideon F.Sm. & N.R.Crouch) Rowley (2013a: 4)

-

8c. var. *gigantea* (M.B.Bayer) Rowley (2013a: 4)

8d. var. *glaucophylla* (M.B.Bayer) Rowley (2013a: 5)

E. *Haworthiopsis* sect. *Tessellatae* (Salm-Dyck) Gildenh. & Klopper comb. nov.

9. *Haworthiopsis granulata* (Marloth) Rowley (2013b: 4)

10. *Haworthiopsis tessellata* (Haw.) Rowley (2013b: 5)

10a. var. *tessellata* = *Haworthia parva* Haworth (1824: 301) ≡ *Aloe parva* (Haw.) Roemer & Schultes (1829: 653) ≡ *Haworthia tessellata* var. *parva* (Haw.)

10b. var. *caussii* (M.Hayashi) Gildenh. & Klopper
c11. *Haworthiopsis venosa* (Lam.) Rowley (2013a: 4) omb. et stat. nov.

11. *Haworthiopsis venosa* (Lam.) Rowley (2013a: 4)

12. *Haworthiopsis woolleyi* (Poelln.) Rowley (2013a: 5)

F *Haworthiopsis* sect. *Trifariae*

13. *Haworthiopsis pungens* (M.B.Bayer) Boatwr. & J.C.Manning in Manning et al. (2014: 14)

14. *Haworthiopsis nigra* (Haw.) Rowley (2013a: 5)

14a. var. *nigra* = *Haworthia schmidtiana* Von Poellnitz (1929a: 23) ≡ *Haworthia nigra* var. *schmidtiana* (Poelln.) Uitewaai (1948: 51)

14b. var. *diversifolia* (Poelln.) Rowley (2013a: 4)

14c. var. *elongata* (Poelln.) Rowley (2013a: 4)

- 14c. var. *elongata* (Poelln.) Rowley (2013a: 4)
15. *Haworthiopsis scabra* (Haw.) Rowley (2013a: 5)
- 15a. var. *scabra*
- 15b. var. *lateganiae* (Poelln.) Rowley (2013a: 5)
- 15c. var. *morrisiae* (Poelln.) Rowley (2013a: 5)
- 15d. var. *smitii* (Poelln.) Gildenh. & Klopper comb. et stat. nov.
- 15e. var. *starkiana* (Poelln.) Rowley (2013a: 5)
16. *Haworthiopsis viscosa* (L.) Gildenh. & Klopper comb. nov.
- 16a. var. *viscosa*
- 16b. var. *variabilis* (Breuer) Gildenh. & Klopper comb. nov.
- G. *Haworthiopsis* sect. *Virescentes* (Baker) Gildenh. & Klopper comb. nov.
17. *Haworthiopsis bruynsii* (M.B.Bayer) Rowley (2013a: 4)
18. *Haworthiopsis sordida* (Haw.) Rowley (2013a: 4)
- 18b. var. *lavranii* (C.L.Scott) Rowley (2013a: 4)
- Note the use of F = forma not used by Manning, Boatwright & Daru.

GILDENHUYS & KLOPPER report that hybrids between *Haworthiopsis* and other species rarely occur and refer to Rowley 2014: 21 and others. They then make new combinations in *Haworthiopsis* for hybrids formerly described as species of *Haworthia*.

- | | |
|--|---|
| 1. <i>Haworthiopsis</i> × <i>broteriana</i> (Resende) Gildenh. & Klopper comb. nov. | 10. <i>Haworthiopsis</i> × <i>resendeana</i> (Poelln.) Gildenh. & Klopper comb. nov. |
| 2. <i>Haworthiopsis</i> × <i>cassytba</i> (Baker) Gildenh. & Klopper comb. nov. | 11. <i>Haworthiopsis</i> × <i>revendettii</i> (Uitewaal) Gildenh. & Klopper comb. nov. |
| 3. <i>Haworthiopsis</i> × <i>curta</i> (Haw.) Gildenh. & Klopper comb. nov. | 12. <i>Haworthiopsis</i> × <i>rigida</i> (Lam.) Gildenh. & Klopper comb. nov. |
| 4. <i>Haworthiopsis</i> × <i>expansa</i> (Haw.) Gildenh. & Klopper comb. nov. | 13. <i>Haworthiopsis</i> × <i>rubrobrunnea</i> (Poelln.) Gildenh. & Klopper comb. nov. |
| 5. <i>Haworthiopsis</i> × <i>bybrida</i> (Salm-Dyck) Gildenh. & Klopper comb. nov. | 14. <i>Haworthiopsis</i> × <i>sampaiana</i> (Resende) Gildenh. & Klopper comb. nov. |
| 6. <i>Haworthiopsis</i> × <i>kewensis</i> (Poelln.) Gildenh. & Klopper comb. nov. | 15. <i>Haworthiopsis</i> × <i>subrigida</i> (Roem. & Schult.) Gildenh. & Klopper comb. nov. |
| 7. <i>Haworthiopsis</i> × <i>lisbonensis</i> (Resende) Gildenh. & Klopper comb. nov. | 16. <i>Haworthiopsis</i> × <i>tauteae</i> (Archibald) Gildenh. & Klopper comb. nov. |
| 8. <i>Haworthiopsis</i> × <i>major</i> (Salm-Dyck) Gildenh. & Klopper comb. et. stat. nov. | 17. <i>Haworthiopsis</i> × <i>tortella</i> (Haw.) Gildenh. & Klopper comb. nov.. |
| 9. <i>Haworthia</i> × <i>pseudorigida</i> (Salm-Dyck) Gildenh. & Klopper comb. nov. | 18. <i>Haworthiopsis</i> × <i>tortuosa</i> (Haworth) Gildenh. & Klopper comb. nov. |

Editor's notes.

- The photographs mentioned in the foregoing are not available for inclusion in this résumé.
- The photographs which follow are from a variety of sources as indicated.
- Note that the foregoing summary was prepared by the Editor. It is limited by copyright and the

size of the original, about 33 A4 pages .

- If you wish to purchase the original publication please contact SEAN D. GILDENHUYS gasteria@iburst.co.za
- Compare the GILDENHUYS & KLOPPER species names with those of Manning, Boatwright & Daru who do not use Variety & Forma (F) .

GILDENHUYS & KLOPPER - species after J.Manning etc.

1. *Haworthiopsis coarctata* (Haw.) Rowley (2013a: 4)
 - 1a. var. *coarctata*
 - 1b. var. *adelaidensis* (Poelln.) Rowley (2013a: 4)
2. *Haworthiopsis fasciata* (Willd.) Rowley (2013a: 4)
 - 2a. var. *fasciata*
 - 2b. var. *browniana* (Poelln.) Gildenh. & Klopper comb. nov.
3. *Haworthiopsis glauca* (Baker) Rowley (2013a: 4)
 - 3a. var. *glauca*
 - 3b. var. *herrei* (Poelln.) Rowley (2013a: 4)
4. *Haworthiopsis longiana* (Poelln.) Rowley (2013a: 4)
5. *Haworthiopsis reinwardtii* (Salm-Dyck) Rowley (2013a: 5)
 - 5a. var. *reinwardtii* f. *reinwardtii*
 - 5b. var. *reinwardtii* f. *chalumnensis* (G.G.Sm.) Gildenh. & Klopper comb. nov.
 - 5c. var. *reinwardtii* f. *kaffirdriftensis* (G.G.Sm.) Gildenh. & Klopper comb. nov.
 - 5d. var. *reinwardtii* f. *olivacea* (G.G.Sm.) Gildenh. & Klopper comb. nov.
 - 5e. var. *brevicula* (G.G.Sm.) Rowley (2013a: 5)
- B. *Haworthiopsis* sect. *Attenuatae* (Pilbeam) Gildenh. & Klopper comb. Nov.
6. *Haworthiopsis attenuata* (Haw.) Rowley (2015: 2)
 - 6a. var. *attenuata*
 - 6b. var. *glabrata* (Salm-Dyck) Rowley (2015: 2)
 - 6c. var. *radula* (Jacq.) Rowley (2015: 2)
- C. *Haworthiopsis* sect. *Koelmaniorum* Gildenh. & Klopper sect. nova
7. *Haworthiopsis koelmaniorum* (Oberm. & D.S.Hardy) Boatwr. & J.C.Manning
 - 7a. var. *koelmaniorum*
 - 7b. var. *mcmurtryi* (C.L.Scott) Gildenh. & Klopper stat. nov.
- D. *Haworthiopsis* sect. *Limifoliae* (G.G.Sm.) Gildenh. & Klopper comb. nov.
8. *Haworthiopsis limifolia* (Marl.) Rowley (2013a: 4)
 - 8a. var. *limifolia*
 - 8b. var. *arcana* (Gideon F.Sm. & N.R.Crouch) Rowley (2013a: 4)
 - 8c. var. *gigantea* (M.B.Bayer) Rowley (2013a: 4)
 - 8d. var. *glaucophylla* (M.B.Bayer) Rowley (2013a: 5)

J Manning etc. - species after DNA & before Guild & KLOP

1. *Haworthiopsis coarctata* (Haw.) G.D.Rowley,
2. *H. fasciata* (Willd.) G.D.Rowley,
3. *H. glauca* (Baker) G.D.Rowley,
4. *H. longiana* (Poelln) G. Rowley
5. *H. reinwardtii* (Salm-Dyck) G.D.Rowley,
6. *Haworthiopsis attenuata* (Haw.) G.D.Rowley,
7. *H. koelmaniorum* (Oberm. & Hardy) Boa. Man.
8. *H. limifolia* (Marloth) G.D.Rowley, *H. longiana* PoelG.D.Rowley,

GILDENHUYS & KLOPPER - species after J.Manning etc

E. Haworthiopsis sect. *Tessellatae* (Salm-Dyck) Gildenh. & Klopper comb. nov.

9. *Haworthiopsis granulata* (Marloth) Rowley (2013b: 4)
10. *Haworthiopsis tessellata* (Haw.) Rowley (2013b: 5)
 - 10a. var. *tessellata* = *Haworthia parva* Haworth (1824: 301) = *Aloe parva* (Haw.) Roemer & Schultes (1829: 653) = *Haworthia tessellata* var. *parva* (Haw.)
 - 10b. var. *caussii* (M.Hayashi) Gildenh. & Klopper c11. *Haworthiopsis venosa* (Lam.) Rowley (2013a: 4) comb. et stat. nov.
11. *Haworthiopsis venosa* (Lam.) Rowley (2013a: 4)
12. *Haworthiopsis woolleyi* (Poelln.) Rowley (2013a: 5)

F *Haworthiopsis* sect. *Trifariae*
13. *Haworthiopsis pungens* (M.B.Bayer) Boatwr. & J.C.Manning in Manning et al. (2014: 14)
14. *Haworthiopsis nigra* (Haw.) Rowley (2013a: 5)
 - 14a. var. *nigra* = *Haworthia schmidtiana* Von Poellnitz (1929a: 23) = *Haworthia nigra* var. *schmidtiana* (Poelln.) Uitewaal (1948: 51)
 - 14b. var. *diversifolia* (Poelln.) Rowley (2013a: 4)
 - 14c. var. *elongata* (Poelln.) Rowley (2013a: 4)
15. *Haworthiopsis scabra* (Haw.) Rowley (2013a: 5)
 - 15a. var. *scabra*
 - 15b. var. *lateganiae* (Poelln.) Rowley (2013a: 5)
 - 15c. var. *morrisiae* (Poelln.) Rowley (2013a: 5)
 - 15d. var. *smitii* (Poelln.) Gildenh. & Klopper comb. et stat. nov.
 - 15e. var. *starkiana* (Poelln.) Rowley (2013a: 5)
16. *Haworthiopsis viscosa* (L.) Gildenh. & Klopper comb. nov.
 - 16a. var. *viscosa*
 - 16b. var. *variabilis* (Breuer) Gildenh. & Klopper comb. nov.

G. *Haworthiopsis* sect. *Virescentes* (Baker) Gildenh. & Klopper comb. nov.
17. *Haworthiopsis bruynsii* (M.B.Bayer) Rowley (2013a: 4)
18. *Haworthiopsis sordida* (Haw.) Rowley (2013a: 4)
 - 18b. var. *lavrani* (C.L.Scott) Rowley (013a: 4)

J Manning et. al. - species after DNA & before Guild & KLOP

9. *Hawoprthiopsis granulata* (Marloth) G.D.Rowley,
10. *H. tessellata* (Haw.) Boatwr. & J.C.Manning,
11. *H. venosa* (Lam.) G.D.Rowley,
12. *H. woolleyi* (Poelln.) G.D.Rowley
13. *H. pungens* (M.B.Bayer) Boatwr. & J.C.Manning,
14. *H. nigra* (Haw.) G.D.Rowley,
15. *H. scabra* (Haw.) G.D.Rowley, *H. sordida* (Haw.) G.D.Rowley,
16. *H. viscosa* (L.) G.D.Rowley,
17. *H. bruynsii* (M.B.Bayer) G.D.Rowley,
18. *H. sordida* (Haw.) Rowley (2013a2 : 4)

IT IS UP TO YOU

Read on and Make a Choice

For some time, some scientists, botanists etc have been saying that species should not continue to be defined by similarities in appearance but by lineage over time using (plants' internal) DNA. Those that followed one lineage (line) over time are a species. Those that changed to a new line are a different species. However, this did not bring about any major changes until Daru et al sectioned large lengths of DNA. (See *Alsterworthia International* Volume 14, Issue 2, 201)

At this stage, Bayer's field work became significant. There was no up-to-date *Haworthia* classification available because Bayer's (decades

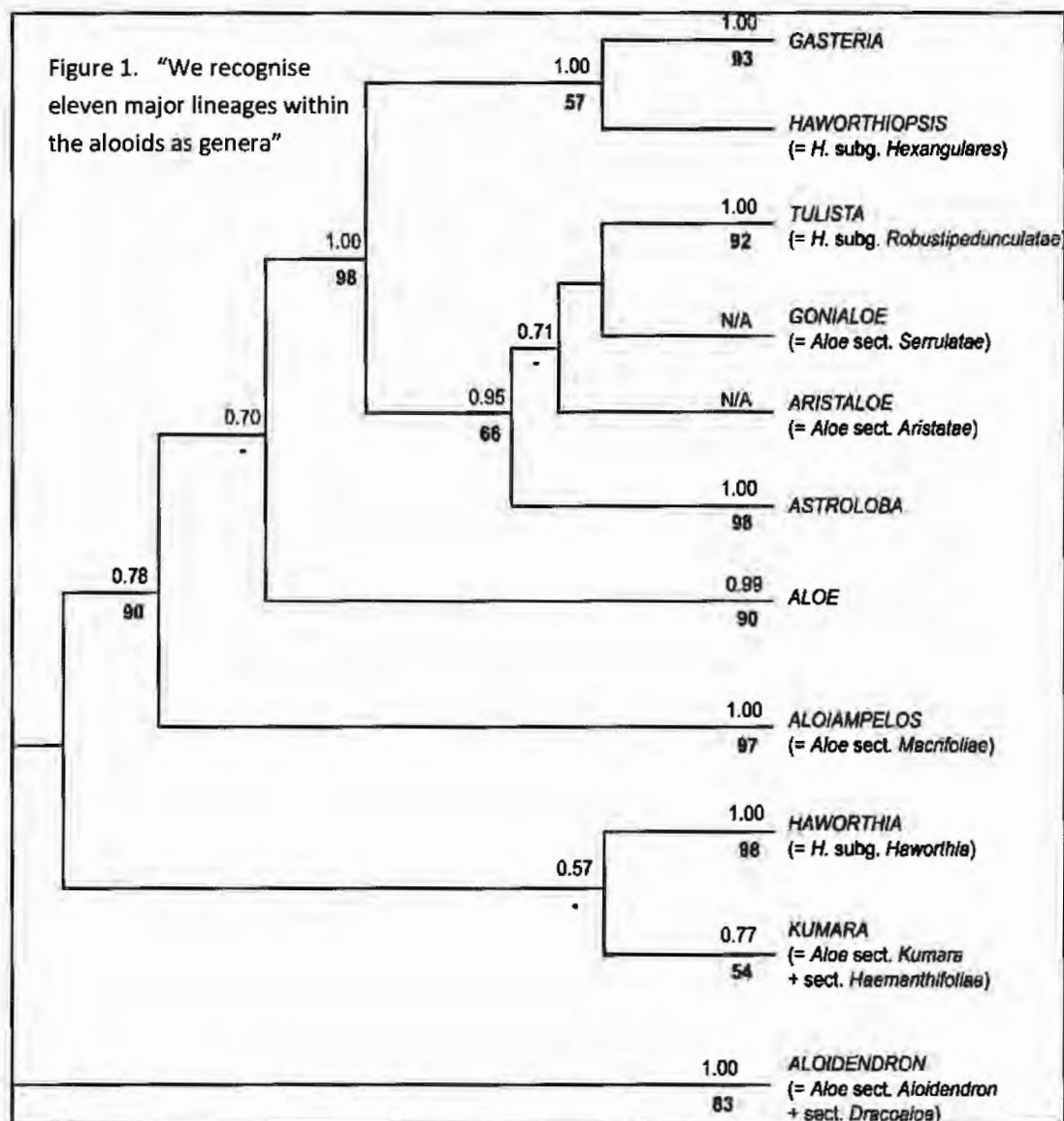
of) field work had been ignored, the reason being that his recommendations to reduce the number of species did not comply with the naming system used by the International Code of Nomenclature for wild plants (the scientists bible) though some/many may have supported his attempt to reduce the number of species.

Bruce Bayer's field work was reported by him in detail in *Haworthia Updates* (1) to 11. *Essays on Haworthia* which covered the progress of field work over time. *Alsterworthia International* published issues 2 - 11 which are available FREE OF CHARGE from "HTTPS:ALSTERWORTHIA.

WORDPRESS.COM/"

If you prefer a printed copy one can be printed on demand. There is of course a charge.

How did Daru et al bring about this remarkable change? By looking at more DNA which gave far more detail than short lengths. Only short lengths were used before. (See *Alsterworthia International* Vol. 14, Issue 2, 201). Their work brought about a revolution. For instance the three subgenera of *Haworthia* were elevated to three new genera in their own right and the number of species were dramatically reduced. This made it



desirable to have a more up-to-date classification on which to form a basis for a revised classification (based on DNA). This was achieved by Bayer and Manning; See *Alsterworthia International*, Volume 12, Issue 1 titled "A rationalization of names in *Haworthia*. A list of species with new combinations and new synonyms". This is well worth reading as it enforces the scientific meaning of names based on using (plants' internal) DNA instead of using a plants visual appearance. The former stresses common lineage but it does not aid identification, whereas the latter does not stress lineage but is a great help to identification. How is this matter resolved?

Nothing new was actually required, only a "change" in the application of the existing "International Code of Nomenclature for Cultivated Plant". Not only does this provide for plants created by man by any method available to him to be classed as cultivars but also for a wild plant or groups of wild plants with slight differences from the rest of the clone, or for a clone itself to be given cultivar status when it differed slightly from other clones. It was exceptional for this to be done..

Some species have different populations of plants which have features in common and some which differ. How do you classify them ? The scientist with access to DNA will use that as the back bone of wild plant genera and species - if you have it in common you have one genus with continuity revealed by the genes, but this does not allow people to identify a plant by its appearance. The alternative is to classify wild plants in accordance with their appearance. If they look the same they are the same genus or species. Both sellers and buyer operate by the appearance of the plants concerned - as indeed do many professionals.

The suggestion is that the International Code of Nomenclature for cultivated plants, which is used to name cultivars created by man, should also be used in certain circumstances to name wild plants as cultivars. Cultivars are created in the wild by accidents. When a copy of the genes of the male

and the one of the female are brought together to produce seed the process normally retains the integrity of both, except that mistakes can occasionally take place. This can produce an abnormal plant, a cultivar. There may be only one or a few but they can be good cultivars in their own right.

Where a genus is widely spread, the spaces between populations may widen because of environmental or man-made changes. The results of isolation may still be that DNA integrity prevails but as a population develops a characteristic of its own that may make the population a cultivar in its own right. In the past many of the isolated populations have been made new species but they could be given cultivar names. One outstanding examples of this being done is that of Van Jarsveld who has named a number of *Gasteria* populations cultivars because they had some discernible difference from other populations which otherwise were the same. It is interesting to compare the species of the new Genus *Haworthiopsis* by Manning, Boatwright & Daru (*Alsterworthia International* Vol. 14. Issue 2, 2124) and those of GILDENHUYS & KLOPPER. Both following the publication of the "New Evolutionary Classification of the Alooids". (See pages 6-7 this issue.) Both have the same number of species but that of Manning etc, records species only and excludes varieties, still widely used these days, and *Forma* hardly ever used. Gildenhuis etc uses all lower taxa down to *Forma*. This seems to confirm that even among scientists there are still differences about how to name wild plants? The difference between scientist on the one hand and nurserymen and purchasing public on the other is that the latter need names to identify plants for sales purposes. Perhaps there will be an impressive move to use cultivar names to replace names abandoned by the scientists. Other possibilities exist.

What do you think. Will some scientist continue to use names below species level and will they not give up giving plants with a small but significant difference variety names and even form names?

The photographs referred to in the previous article for the Genus *Haworthiopsis* are not available for inclusion.

Therefore, selected photographs obtained from reliable source are included.



Haworthiopsis limifolia RTH 103 (Humans port)



Haworthiopsis limifolia MBB 7145 (Three Sisters)



Haworthia limifolia var. *arcana*



Haworthiopsis limifolia (three sisters)



Haworthia limifolia var. *striata* MBB 7137



Haworthiopsis limifolia var. *arcana* IB 6746



Haworthiopsis limifolia. MBB 7144

(Monks Dam ? Writing not clear)



Haworthiopsis limifolia MBB 714 7143

(S. Malilane ? Writing not clear)

Haworthiopsis limifolia IB10840



Haworthiopsis limifolia var.
gigantea IB5652







The photographs of plants published in this issue of *Alsterworthia International* were named before the results of the DNA analysis were known. They reflected the naming system used at that time and adapted later.

After the DNA results were reviewed, J. Manning et al reviewed the current names of plants. The result was that they set aside naming plants primarily on their looks and now assessed them on genetic material. Those that had the same "core of DNA" over time were regarded as the same and became the same genus. As a consequence, the genus *Haworthia* (sensu lato) was divided into three genera: *Haworthia* (sensu stricto), *Haworthiopsis* and *Tulista* which in turn were divided into species only.

This was followed by a revision of only *Haworthiopsis* by Gildenhuis & Klopper.

The results of these two are set side by side for comparison on pages 6 & 7 of this issue of *Alsterworthia International*. Each has 18 species. For J. Manning et al that is all. They do not believe that a scientific classification requires anything more than analysis of DNA and no subdivisions below species. They did of course recognise that scientific classification was unsuitable for non-scientific purposes (nurseries and their customers) and suggested that anything below species should be given cultivar names in accordance with the International Code of Nomenclature for Cultivated Plants.

Ingo Breuer has a large nursery and is well experienced. He has written a number of books on the history of succulent plants, particularly haworthias. His latest is "Some new combinations in *Haworthia*, *Haworthiopsis* and *Tulista*" (see *Alsterworthia International* Volume 16 Issue 2. July 2016.)

Thus, we now have 3 (4) different classifications: The scientific by J. Manning et al with few species and no subdivisions below species, the scientific by GILDENHUIS & KLOPPER. as for J. Manning et al but with classifications below the level of species and Ingo Breuer's classification also based on J. Manning et al but with more species and varieties. None of these show any signs of divisions below species being replaced with cultivar names - (the 4th). **Which would suit you best?**



Haworthia koelmaniorum var. *mcmurtryi* (C. L. Scott) M. B. Bayer

Initially the plant above was described as *H. mcmurtryi*, its clear affinity led Bayer to reduce it to a variety of the larger, usually more coppery-coloured *H. koelmaniorum*. The smaller variety differs in its shorter, deltoid leaves, more prominent surface tubercles and higher degree of translucence. This offering has required a number of propagation efforts to produce enough to distribute. Initially, we received two batches of seed with the same locality information but collected respectively from a plant with larger, retuse leaves and another that was smaller and darker like *H. atrofusca*. The seedlings of both batches exhibited a nearly identical range of variation. Even combined, these two batches were too limited in number for an offering so have been supplemented with leaf propagation and tissue culture of numbered clones. Therefore, we offer plants of HBG 81825 and 81826, from seed and successive vegetative propagation. The original seed collection was made over a four-week period in the autumn of 1995 by Charles Craib in the hill country near Verena, about 30 km W of the type locality of Loskop Dam. This is the most northerly species of *Haworthia*, coming from Limpopo Prov., S. Africa. \$10.

I.S.I. distribution 2014.



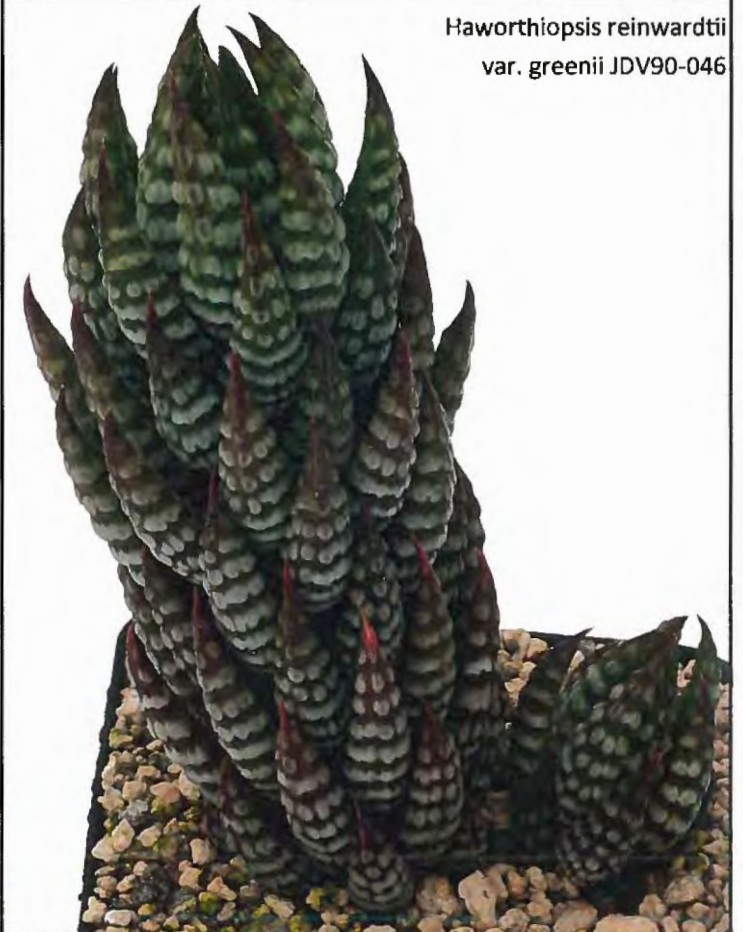
Haworthiopsis coarctata Haw. The plant above was received by the ISI from G.G. Smith under the name *Haworthia bacata*, collection number 3572, collected 9 miles SW of Stutterheim. It was distributed as ISI 1567. There was controversy over a number of plants which finally ended up as *Haorthioiopsis coarctata*.



Haworthiopsis reinwardtii var. *coarctata* IB7025



Haworthiopsis reinwardtii var. *olivacea* IB6976



Haworthiopsis reinwardtii var. *greenii* JDV90-046

Haworthiopsis reinwardtii
var. *brevicula* IB525



Haworthiopsis
reinwardtii var.
venius IB6545



Haworthiopsis
reinwardtii
IB8555



J. MATHEWS et al have changed all the various forms of *Haworthia reinwardtii* into one species - *Haworthiopsis reinwardtii*.

GILDENHUYS & KLOPPER accept five varieties of *Haworthiopsis*. One is a species but four are only forms (forma = F) of which one is *Haworthiopsis* var. *reinwardtii* f. *reinwardtii* itself! This gives *Haworthiopsis* var. *brevicula* a higher status than *Haworthiopsis* var. *reinwardtii* f. *reinwardtii*, which is a grade lower. I have yet to fathom out this one!

INGO BREUER in his "Some new combination in *Haworthia*, *Haworthiopsis* and *Tulista*" (See *Alsterworthia International* Vol. 16, Issue 2) he has 6 varieties of *Haworthiopsis*. See above and opposite. You will also see that *Coarctata* ended up as a variety of *Haworthiopsis*

Haworthiopsis venosa var. *venosa*
DMC12751



Look carefully and you will see that whilst both plants have a similarity they do appear to be different., notably in the leaf markings and colours.

Haworthia venosa var. *venosa* has distinct tubercles on the leaf underside and a distinct network of elongated lines connected by horizontal lines with the markings being light brown and the background a dark blackish brown on the face.

Haworthiopsis venosa var. *woolleyi* IB635



Haworthiopsis venosa var. *woolleyi* has a dark green background on both sides of the leaf with fewer dirty white spots on the reverse side and a few, elongated and interrupted black longitudinal lines on the upper side. It also appears to have fewer marginal spines than *Haworthia venosa* var. *venosa*.

Post DNA both of these plants are regarded as *Haworthiopsis venosa* by both J. Manning et al and Gildenhuys & Klopper.

In the interest of nurseries and their customers Breuer retains both as species.



Haworthiopsis nigra IB6556



Haworthiopsis nigra var. *diversifolia*. IB7121

Both Gildenhuys et al. and Breuer accept the two shown above. J. Manning just the one species.



Haworthiopsis nigra var. *elongata*



Haworthiopsis scabra

Manning et al accept only the one species, *nigra*.

Ingo Breuer accepts two varieties, *nigra* and *diversifolia*.

Gildenhuys & Klopper accept three varieties *nigra*, *diversifolia* & *elongata*.

Haworthiopsis scabra-above, below, next page and the following one. *Scabra* is a variable species., only a few photos are shown. Gildenhuys & Klopper accepts five. So does Breuer but not all are the same.



Haworthiopsis scabra
var. *starkiana*. SS1166



Haworthiopsis scabra
var. *lateganae*. VDV112

Haworthiopsis scabra
var. *smitii*. JDV90-82



Haworthiopsis scabra
var. *scabra*. JDV86-93



Haworthiopsis scabra
var. *lateganae*. VDV112



Haworthiopsis scabra
var. *smitii*. JDV90-82



Haworthiopsis scabra
'plettens', Wittedrift



Haworthiopsis scabra var. *smitii* and *Haworthiopsis scabra* 'Plettens', Wittedrift are two examples of those which have not been included by any of the three mentioned on the previous page. One of these does have a cultivar name (progress?) photograph at left. If you go on the internet just type in *Haworthia*/*Haworthiopsis scabra* to obtain details of ones not included by Manning et al, Gildenhuys & Klopper and Breuer.



Left.

Haworthiopsis scabra, Leeubl. Accepted by all mentioned on previous pages.

Above

Haworthia scabra var. *johanii* accepted only by Breuer.

The Editor acknowledges the use of some information available freely on the web and the use of information sent to the Editor in the past, but not previously used.

The publication rights are held by the publisher of Haworthiopsis compiled by GILDENHUYS & KLOPPER, not by the authors themselves. It was therefore only possible for the Editor to summarise the article, not to reprint it. You may therefore wish to acquire the full article.

The article is lengthy with lots of interesting information, some 41 A3 pages. If you wish to purchase a copy I suggest you contact SEAN D. GILDENHUYS at gasteria@iburst.co.za

For those of you who may wish to purchase a publication produced by Ingo Breuer, Germany, please contact him by e.mail - IBreuer@t-online.de - if you wish to pay in Euros.

To pay in British Pounds please contact the Editor.

hmays@freenetname.co.uk



The three agree.
Was *Haworthia pungens*
Now *Haworthiopsis pungens*



Haworthiopsis granulata var. *granulata*



Both J Manning et. al. and Gildenhuys & Kloppe record this as one species following the DNA analysis. Ingo Breuer records it as two *Haworthiopsis granulata* var. *granulata* and var. *schoemaniai*. Prior to DNA Dr Hayashii described the plant as *Haworthia schoemaniai*. (It is said to grow like *Haworthiopsis venosa* or *Haworthiopsis tessellata* in cultivation. ?)

Haworthiopsis granulata comes from the Ceres Karoo, where it is quite widely distributed. It grows in high rocky mountainous areas as well as in flats amongst small bushes and stones. It is usually caulescent and forms tall erect stems. It offsets slowly.

Haworthiopsis granulata var. *schoemaniai*. MH0309.
See page 14. Confusing??





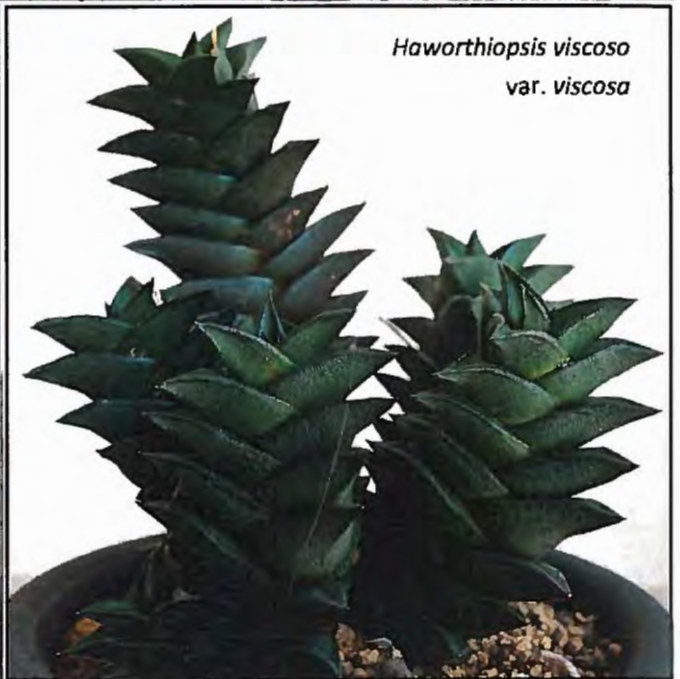
Haworthiopsis sordida var.
sordida



Haworthiopsis sordida
var. *lavranii*.



Haworthiopsis sordida var.
agavaoides



Haworthiopsis viscosa
var. *viscosa*



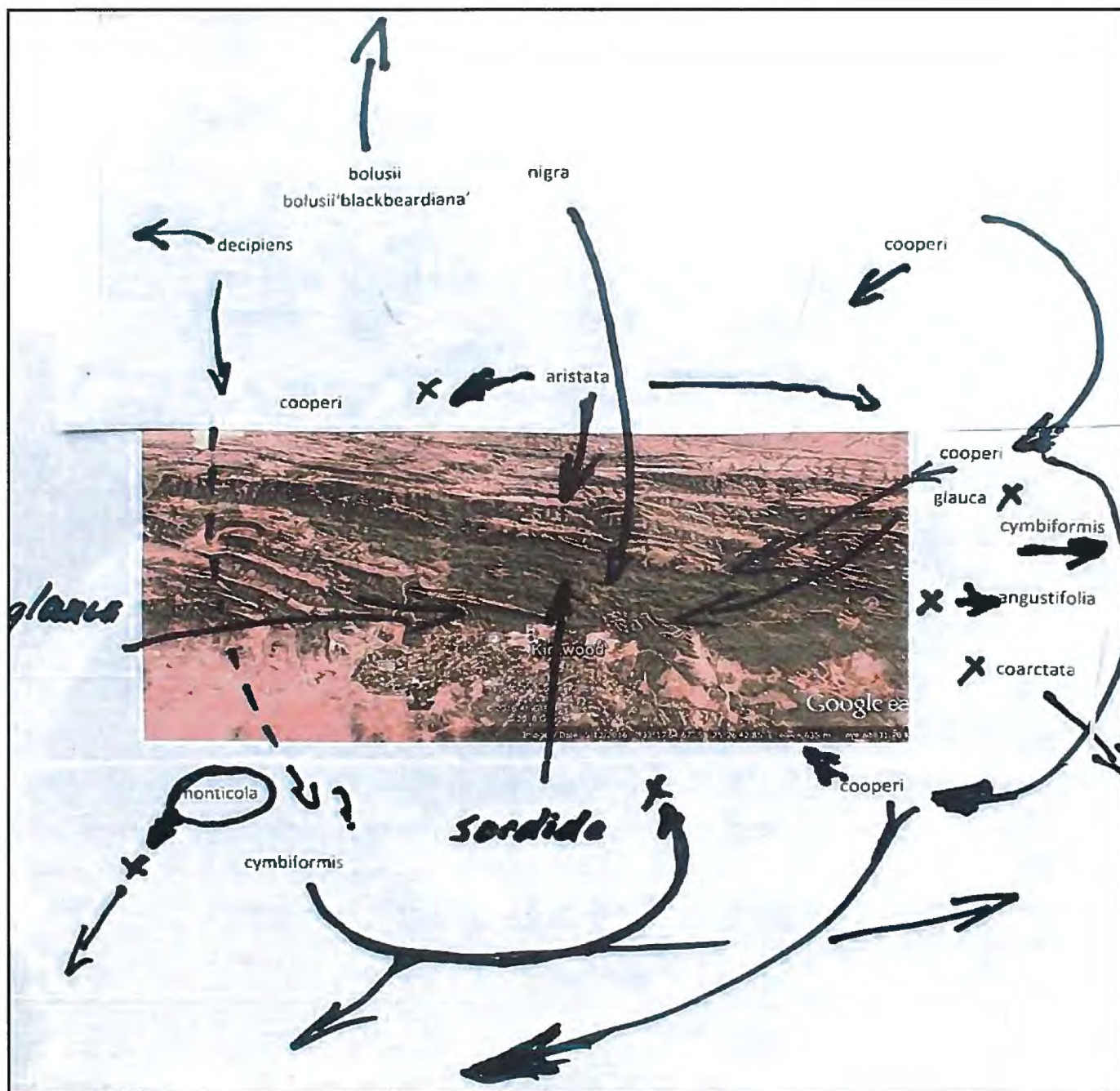
Haworthiopsis viscosa vat. *Beanii*.

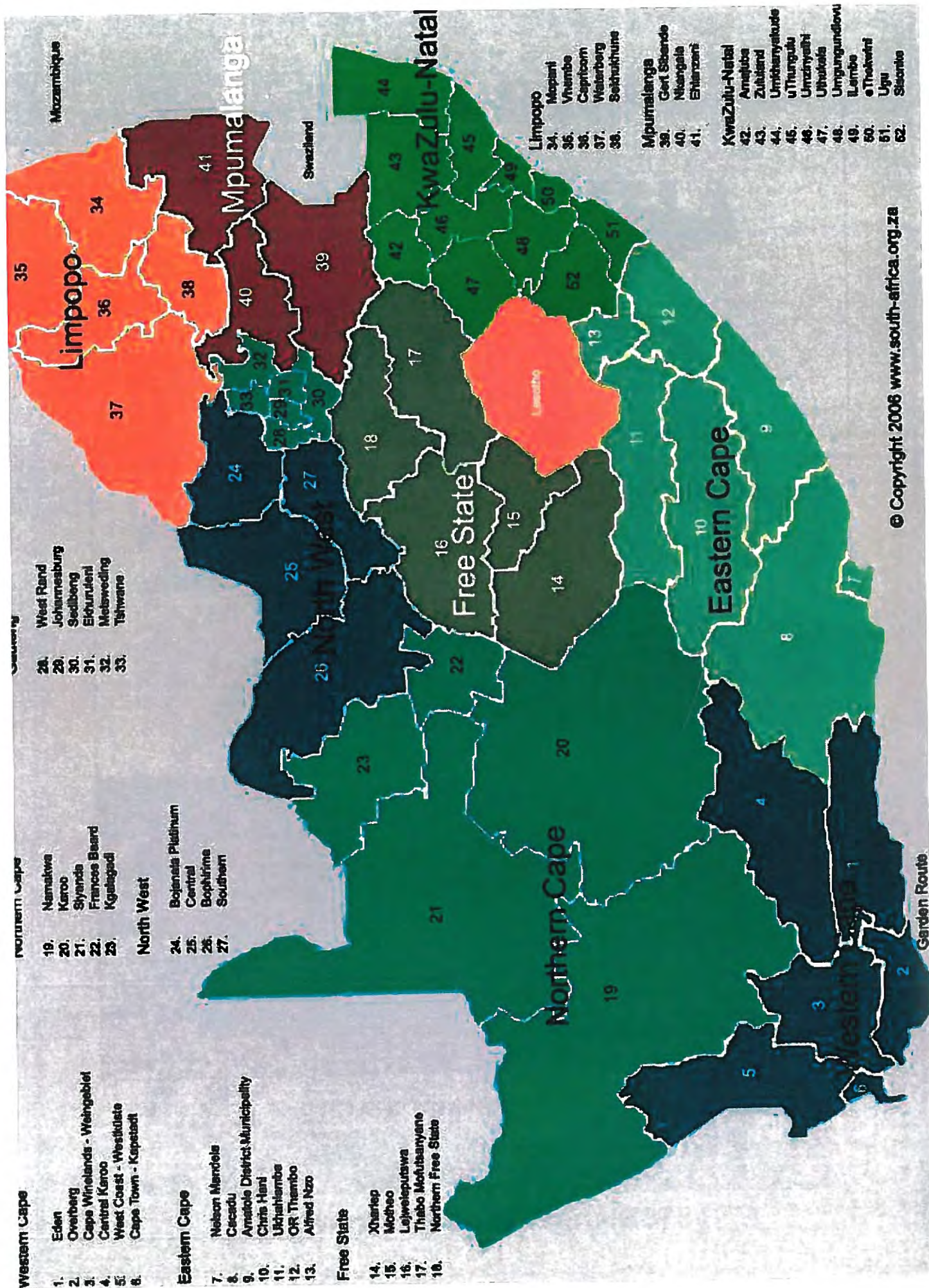
Haworthiopsis viscosa is very variable throughout its range and, therefore, to divide it into varieties is not the easiest of tasks. For the system of Manning et al. it is straight foreword as all the plants fall into one species, *viscosa*. Gildenhuis et al decided on two, var. *viscosa* and var. *variabilis*. Ingo Breuer decided on three, var. *viscosa*, var. *asperiuscula* and var. *beanii*. (When it is decided to have varieties in addition to species, the species name automatically becomes a variety e.g. *Haworthiopsis viscosa* var. *viscosa*, i.e. the dust bag for the rest whatever they are. I predict that we can expect change in *viscosa*'s varieties in due course.

H.M.

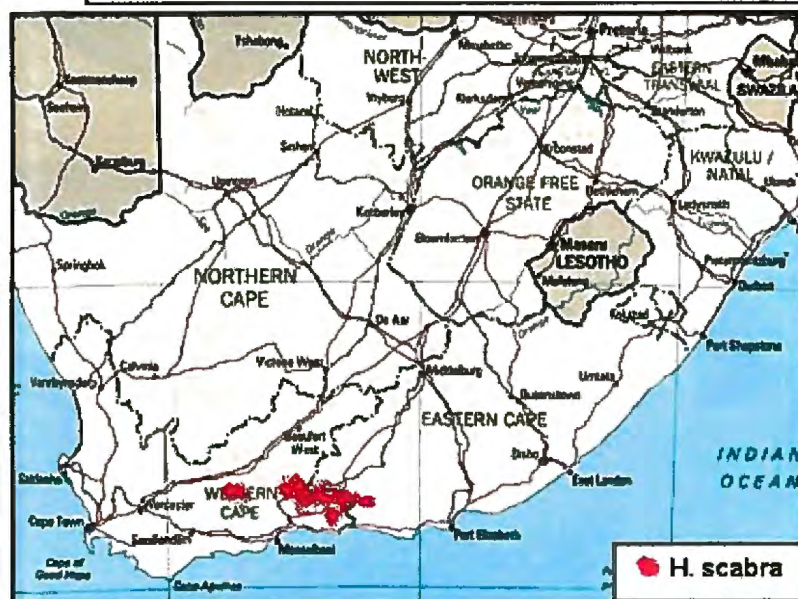
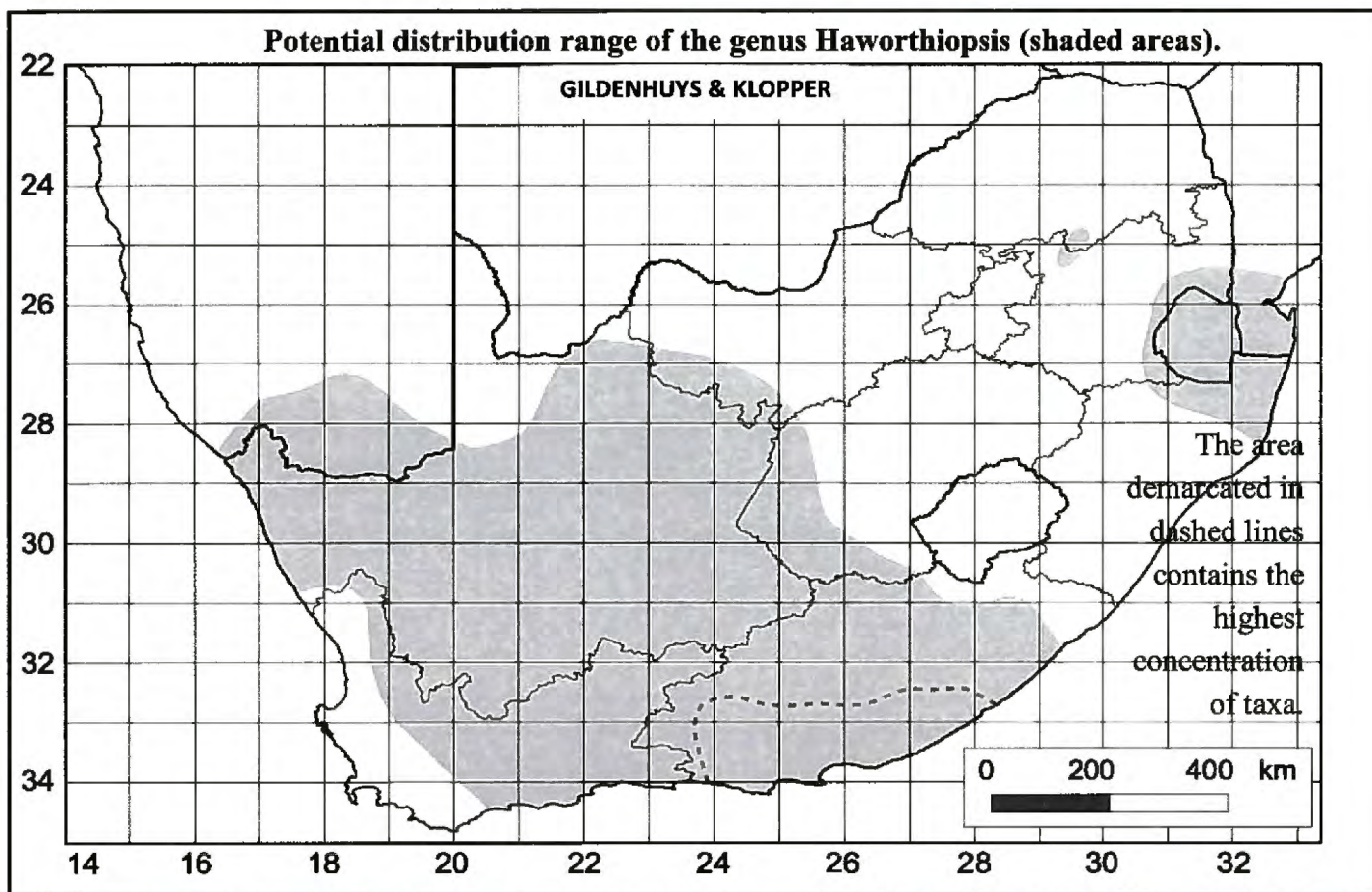
Congratulations to Bruce Bayer

On July 21, 2016 Bruce Bayer apparently sent the diagram below to Facebook to explain his reasons for recommending that a species should cover a much greater area than was common at that time. He stated "Not a great diagram but a way to appreciate the dramatic choreography of plant distribution and how it impacts on classification. Without it haworthia names make no sense other than as imagined and fantasized. *Cooperi* and *cymbiformis* occur as intertwined species to the east and south. In the south they extend westwards to get lost in *H. mucronata*. *Cymbiformis* as an independent species does not enter Kabuga except as an observable variant of *H. cooperi*. The *cooperi* gets lost westwards as variants of *H. Decipiens*. Perhaps close northwards as *H. aristata*. *H. glauca* does cross the Zuurberg but is here confused with *H. coarctata* that may occur in recognisable form on the eastern tip. *Angustifolia* is on the eastern end too but does not enter Kaboega. Neither do *H. monticola* or *H. zantneriana* from the west. This is also closely tied to the intrigue of winter vs summer rainfall and still further to the massive geological changes of the very recent.." Bruce Bayer's field observations and the DNA results came together and, guess what, they found common ground in the concept of fewer and all-embracing species with no varieties was bourn. If you do not believe me see pages 6 & 7 of this journal and what follows. The person who sent Bayer's diagram and comments to Facebook on 6/1/2017 commented himself on what Bruce had said "It shucked". He/she could not have been farther from the truth. **Well done Bruce.**





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The above two maps show the distribution of two species – *Haworthiopsis scabra* and *Haworthiopsis pungens* respectively.

The map to the right shows the areas where the genera *Haworthia*, *Haworthiopsis* and *Tulista* grow.

Back page. Shows the types of areas where the named *Haworthiopsis* grow (and other genera).

You are not expected to locate the plants!



Haworthiopsis viscosa



Haworthiopsis nigra



Haworthiopsis venosa.



Haworthiopsis nigra



Haworthiopsis scabra .



Haworthiopsis sordida



Haworthiopsis scabra



Haworthiopsis nigra

