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RESEARCH ARTICLE

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A review of the *Attagenus* (Coleoptera: Dermestidae) species from South Africa and an image-based key to identification

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The Dermestidae is a relatively poorly studied family of insects but with a high rate of species discovery. The South African region is particularly rich in Attagenus spp. many of which are distinctively patterned. This study provides an updated list of Attagenus spp. in South Africa with a complete literature review and an image-based identification key to the Attagenus species within South Africa. Images of most species are provided. With the rise in significance of citizen science recording schemes, this study facilitates image-based identification and encourages both entomologists and citizen scientists to further contribute to the understanding of this beautiful Coleopteran family.

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INTRODUCTION

Dermestidae (Insecta: Coleoptera), the skin, hide, and carpet beetle family, is a moderately speciose group comprising about 1900 species globally (Háva 2023). The family includes 60 genera. The number of species in the genus *Attagenus* Latreille, 1802 has grown by 47% in the last 50 years from 170 spp. (Mroczkowski 1968) to over 250 spp. in 2021 (Háva 2023). Given the rate at which new species are being described and the very small number of people contributing to their taxonomy, it is likely that there remain many more species yet to be discovered. Associated with this high rate of discovery is an almost continual reassessment of the taxonomy of the genus (Háva 2023). Recently, several *Attagenus* species have been moved to *Lanorus* Zhou et al., 2022 *Lanorus* is comparatively small (23 species); most species remain as *Attagenus*.

Mroczkowski (1968) maintained that two zoogeographical regions were rich in *Attagenus*: the Palaearctic and the African regions (Ficetola et al. 2017) (African region is contained within the Ethiopian region referred to by Mroczkowski (1968)). The Palaearctic species are better known and currently about 75 *Attagenus* spp. have been described from this region. The wider African region (including the Saudi peninsular) has been less well studied. Even so, about 170 species have been described from the African region (NB some species occur in both the Palaearctic and African regions). A list of the *Attagenus* species in South Africa was published by Herrmann and Háva (2020), but no literature was linked to each species to facilitate the assessment of the authenticity of each entry.

Hermand and Holloway (2020) carried out a morphological examination of *A. rufiventris* Pic, 1927, a species known from South Africa. In their study, Hermand and Holloway (2020) noted that among the South African species of *Attagenus*, *A. rufiventris* was very easy to recognize using the elytral colour pattern. Many of the South African *Attagenus* species are attractively coloured. The identification of colourful taxa, such as Lepidoptera and Odonata, is achieved using colour patterns, exclusively. Identification guides to Dermestidae are scarce but include Peacock (1993) and Háva (2011). Both rely on the use of dichotomous keys using morphological characters even though in many instances the colour and pattern of the species in question is distinctive. There is a great deal of colour pattern variation among species of *Attagenus*. One possible reason why few people are working on Dermestidae is that there are insufficient guides to identification facilitating entry to the group delivered in a manner that might inspire students of Coleoptera to dig deeper into aspects of Dermestidae taxonomy, ecology, and distribution.

The current study has two objectives:

- to present an updated list of *Attagenus* spp. of South Africa with a complete literature review, and
- to produce a simple image-based identification guide and accompanying key to the *Attagenus* species of South Africa focusing solely on dorsal colour patterns.

METHODS

The list of South African *Attagenus* species produced by Herrmann and Háva (2020) was used as a starting point and revised using Háva (2022, 2023). Háva (2023) was used as a guide to current taxonomy. After this process, an extensive literature search was carried out to establish the original source relating to each record and additional references relating to *Attagenus* in South Africa.

A dichotomous key was generated based entirely on dorsal colour pattern. Colour patterns of South African *Attagenus* species were obtained from Herrmann (2023) and Háva (2016). To ensure high-quality images of *Attagenus* colour patterns, illustrations were created using acrylic paint on high-density 200 g cartilage paper. The limbs, head, and antennae were excluded from the illustrations to emphasise elytral pattern and colour variation. Illustrations were imaged using an Olympus TG4. Body length (BL) (front margin of pronotum to apices of elytra) was

included for each species in the key. BL values were obtained from Herrmann (2023) unless otherwise stated. Distribution data were from Háva (2023).

RESULTS

Forty-four species of *Attagenus* are recorded from South Africa (Table 1). No original source evidence supporting the occurrence of *A. brunneus* Faldermann, 1835, which has a wide global distribution (Háva 2023), could be found. Species affiliated with supporting literature are listed in bold.

Table 2 presents a dichotomous key with species differentiation based on dorsal colour pattern and supplemented with BL where available. Using this approach, two-thirds (30/44) of the species of *Attagenus* found in South Africa can be differentiated comfortably (Figures 1–6). A smaller number might require further investigation to be sure of identification, hence a number of these species are omitted but listed at the end of the key.

DISCUSSION

Herrmann and Kadej (2017) produced a checklist of *Attagenus* species in South Africa. The list extended to 34 species. Since then, there have been changes with ten *Attagenus* species added to the list: *A. donkieri* Pic, 1916 and *A. freyi* Herrmann, Háva and Kadej, 2017, (Herrmann et al. 2017; Háva and Herrmann 2018), *A. heres* Háva, 2022 (Háva 2022), *A. kaniai* Háva and Kadej 2008 (Háva and Herrmann 2022), *A. lambertensis* Háva, 2022 (Háva 2022), *A. miles* Háva, 2022 (Háva 2022), *A. orangensis* Háva, 2022 (Háva 2022), *A. roberti* Herrmann and Háva, 2020 (Herrmann and Háva 2020), *A. snizeki* Háva, 2022 (Háva 2022), *A. wittmeri* Háva, 2022 (Háva 2022). The new species recorded by Háva (2022) require better images to be useful in the context of the current study. However, Háva (2022) states which species included in Table 2 resemble the species described by Háva (2022). *Attagenus pellio* Linnaeus, 1758 is recorded as cosmopolitan by Háva (2023), implying that it could also be found in South

Table 1. Species of ***Attagenus*** believed to occur in South Africa. Sources of records for each species, where known, are provided. Records associated with supporting literature are in bold.

Dermestidae Latreille, 1804

Subfamily Attageninae Laporte de Castelnau, 1840

Genus *Attagenus* Latreille, 1802

1. ***Attagenus albonotatus* Pic, 1927** [South Africa] (Herrmann et al. 2015).
2. ***Attagenus aurofasciatus* Háva, 2005** [Namibia, South Africa] (Reitter 1881)
3. ***Attagenus boroveci* Háva, 2016** [South Africa] (Háva 2016)
4. *Attagenus brunneus* Faldermann, 1835 [Europe: Cyprus, Turkey. Africa: Algeria, Egypt, Morocco, Tunisia, South Africa, North America: Canada, Mexico, U.S.A. Asia: Afghanistan, China, Iran, Israel, Russia, South Korea, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan, Yemen]
5. ***Attagenus capensis* Reitter, 1881** [South Africa] (Guérin-Méneville 1844 Reitter 1881; Herrmann et al. 2015)
6. ***Attagenus capronatus* Herrmann, Kadej and Háva, 2015** [South Africa] (Herrmann et al. 2015)
7. ***Attagenus cinereus* (Thunberg, 1815)** [Namibia, South Africa] (Thunberg 1815)
8. ***Attagenus constantini* Herrmann, Kadej and Háva, 2015** [South Africa] (Herrmann et al. 2015.)
9. ***Attagenus danielssoni* Herrmann, Kadej and Háva, 2016** [South Africa] (Herrmann et al. 2016)
10. ***Attagenus diversesignatus* Pic, 1942** [South Africa] (Pic 1942)
11. ***Attagenus diversus* Reitter, 1881** [South Africa, Tanzania] (Reitter 1881)
12. ***Attagenus donckieri* Pic, 1916** [Angola, Congo, South Africa] (Háva and Herrmann, 2018)
13. ***Attagenus fasciatopunctatus* Reitter, 1881** [South Africa] (Reitter 1881; Herrmann et al. 2015)
14. ***Attagenus fasciatus* (Thunberg, 1795)** [cosmopolitan] (Thunberg 1795)
15. ***Attagenus flexicollis* Reitter, 1881** [Mozambique, South Africa] (Reitter 1881)
16. ***Attagenus freyi* Herrmann, Háva and Kadej, 2017** [South Africa] (Herrmann et al. 2017)
17. ***Attagenus fulvicollis* Reitter, 1881** [South Africa] (Reitter 1881)
18. ***Attagenus grandjeani* Pic, 1942** [Mozambique, South Africa] (Hava 2016)
19. ***Attagenus heres* Háva, 2022** [South Africa] (Háva 2022)
20. ***Attagenus holmi* Kalík and Háva, 2005** [Mozambique, South Africa] (Kalík and Háva 2005)
21. ***Attagenus hottentotus* (Guérin-Méneville, 1844)** [Mozambique, South Africa] (Guérin-Méneville 1844; Reitter 1881)
22. ***Attagenus jucundus* Péringuey, 1885** [Mozambique, South Africa, Zambia] (Peringuey, 1885)
23. ***Attagenus kaniai* Háva and Kadej, 2008** [Namibia, South Africa, Zambia, Zimbabwe] (Háva and Herrmann, 2022)
24. ***Attagenus lambertensis* Háva, 2022** [South Africa] (Háva 2022)
25. ***Attagenus leopardinus* Reitter, 1881** [South Africa] (Reitter 1881)
26. ***Attagenus matamata* Kadej and Háva, 2015** [South Africa] (Kadej and Háva, 2015; Háva and Herrmann, 2018)
27. ***Attagenus miles* Háva, 2022** [South Africa] (Háva 2022)
28. ***Attagenus muelleri* Herrmann, Kadej and Háva, 2015** [South Africa] (Herrmann et al. 2015)
29. ***Attagenus orangensis* Háva, 2022** (Háva 2022)
30. ***Attagenus pardus* Arrow, 1915** [Botswana, Namibia, South Africa, Tanzania, Zimbabwe] (Pic 1927)
31. ***Attagenus prescutellaris* Pic, 1927** [South Africa] (Kalík and Háva 2005)
32. ***Attagenus pseudocapensis* Herrmann, Kadej and Háva, 2015** [South Africa] (Herrmann et al. 2015)
33. ***Attagenus pseudocinereus* Herrmann and Kadej, 2017** [South Africa]] (Herrmann and Kadej 2017)
34. ***Attagenus pustulatus* (Thunberg, 1815)** [South Africa] (Thunberg 1815)
35. ***Attagenus rhodesianus* Pic, 1927** [Angola, Congo, Kenya, Mozambique, Namibia, South Africa, Tanzania, Zimbabwe] (Pic, 1927)
36. ***Attagenus roberti* Herrmann and Háva, 2020** [South Africa] (Herrmann and Háva, 2020)
37. ***Attagenus romani* Háva, 2016** [South Africa] (Háva 2016)
38. ***Attagenus rufiventris* Pic, 1927** [South Africa, Tanzania, Uganda] (Kalík and Háva 2005)
39. ***Attagenus schawalleri* Herrmann, Kadej and Háva, 2015** [South Africa] (Herrmann et al. 2015)
40. ***Attagenus snizeki* Háva, 2022** [South Africa] (Háva 2022)
41. ***Attagenus thunbergi* Mroczkowski, 1968** [South Africa] (Thunberg 1815)
42. ***Attagenus unicolor* (Brahm, 1791)** [cosmopolitan] (Brahm 1791)
43. ***Attagenus vestitus* Klug, 1855** [Angola, Congo. Kenya, Mozambique, Namibia, South Africa, Tanzania, Zimbabwe] (Pic 1927)
44. ***Attagenus wittmeri* Háva, 2022** [South Africa] (Háva 2022)

Table 2. Dichotomous key for South African *Attagenus* spp. based on dorsal pattern variation.

1. Reddish markings on elytra (2)
— Pale (often greyish) markings on elytra or elytra without markings (18)
2. No reddish hairs pronotum (3)
— Varying amounts of reddish hairs on pronotum (5)
3. Mottled reddish with patches of whitish hairs covering elytra: *A. diversesignatus*. BL = 3.5–5 (Herrmann 2022) [Figure 1a]
— No reddish hairs on apical half of elytra (4)
4. One reddish patch on each elytron: *A fasciatus*. BL = 4.3–5.9 (Herrmann 2022) [Figure 1b]
— Two reddish patches on each elytron: *A rufiventris*. BL = 3.7–4.6 (Hermand and Holloway 2020) [Figure 1c]
5. Apices of elytra with patches of reddish hairs (6)
— Apices of elytra devoid of reddish hairs (12)
6. Pronotum entirely covered in reddish hairs (7)
— Pronotum with some dark patches devoid of reddish hairs (9)
7. Seven dark isolated spots spread across both elytra: *A. pardus*. BL = 3.5–4.5 (Hermann 2022) [Figure 1d]
— No dark spots on elytra but a single dark band crossing both elytra (8)
8. Mid-elytral black band formed by three diamonds, the central one obviously deeper than lateral ones; sub-basal black spots joining at elytral suture: *A. romani*. BL = 3.8 (Háva 2016) [Figure 1e]
— Mid-elytral black band consisting of three more or less equal sized diamonds; sub-basal black spots not joined at elytral suture: *A. grandjeani*. BL = 3.5–4.0 (Hermann 2022) [Figure 1f]
9. Posterior corners of pronotum devoid of reddish hairs (10)
— Posterior corners of pronotum carrying extensive reddish hairs (12)
10. More than two reddish spots on pronotum: *A. pustulatus*. BL = 3.5—4.0 (Herrmann 2022) [Figure 2a]
— Two clear reddish spots on pronotum (11)
11. Elytra with two reddish bands: *A. matamata*. BL = 4.0 (Kadej and Háva 2015) [Figure 2b]
— Elytra with three reddish bands: *A. holmi*. BL = 3.5–4.0 (Herrmann 2022) [Figure 2c].
12. Elytral apices carrying reddish hairs (13)
— Elytral apices carrying dark hairs (14)
13. Reddish spots not joining at elytral suture: *A. aurofasciatus*. BL = 3.5–4.0 (Herrmann 2022) [Figure 2d]
— Reddish spots merging at elytral suture to form single apical spot: *A. diversus*. BL = 3.0–4.0 (Herrmann 2022) [Figure 2e]
14. Reddish hairs on sides of the scutellum (15)
— Mainly dark hairs on sides of the scutellum (17)
15. Basal margins of elytra mainly dark haired: *A. prescutellaris*. BL = 3.5–4.0 (Herrmann 2022) [Figure 2f]
— Basal margins of elytra with mainly (more than 50%) reddish hairs (16)
16. Dark, unbroken band across middle of pronotum: *A. fulvicollis* BL = 3.0–4.0 (Herrmann 2022) [Figure 3a].
— Dark spots but no band crossing pronotum: *A. hottentotus*. BL = 5.0 (Herrmann 2022) [Figure 3b]
17. Apical elytral bands zigzag: *A. freyi*. BL = 2.8 (Herrmann et al. 2017) [Figure 3c]
— Apical elytral bands straight: *A. flexicollis*. BL = 3.0–4.0 (Herrmann 2022) [Figure 3d]
18. Elytra dark, no pale hairs (19)
— Elytra with pale hairs (20)
19. Elytra widest at shoulders tapering towards apices: *A. brunneus*. BL = 2.0–5.0 (Herrmann 2022) [Figure 3e]
— Elytra more or less parallel for the first 2/3 towards rounded apices: *A unicolor*. BL = 2.5–5.5 (Herrmann 2022) [Figure 3f]
20. Elytra mottled or with small flecks of whitish hairs (21)
— Elytra with well defined spots or bands or rings (22)
21. Elytra and pronotum irregularly covered in patches of white scales producing a mottled effect. *A. cinereus*. BL = 3.5–4.0 (Herrmann 2022) [Figure 4a]
— Elytra with a just few scattered flecks of white hairs: *A. pseudocapensis*. BL = 3.9–4.4 (Herrmann 2020) [Figure 4b]
22. Pale bands (e.g. Figure 5d) or circles (e.g. Figure 4b) in basal half of elytra (23)
— No bands or circles but well-defined pale spots in basal half or middle of elytra, or basal half of elytra entirely covered in pale hairs (32)
23. Apices of elytra with isolated pale spots (more than a few isolated pale hairs) (24)
— Apices of elytra entirely dark (30)
24. Basal and sub-basal bands joined forming a circle (25)
— Basal (when present) and sub-basal bands not joined forming a ring (27)
25. Basal and sub-basal bands very broad so that entire basal half of elytra coated in pale hairs and on each elytron a dark spot in the middle of the pale area and a smaller dark spot in the middle of the basal margin: *A. vestitus*. BL = 3.5 (Herrmann 2022) [Figure 4c]
— Basal and sub-basal bands narrower, dark spots larger (26)
26. Pre-apical band broad, almost straight across each elytron: *A. danielssoni*. BL = 3.1 (Herrmann et al. 2016) [Figure 4d]
— Pre-apical band narrow with extensive zig-zags, sometimes consisting of separated pale dots: *A. leopardinus*. BL = 3.5–5.0 (Herrmann 2022) [Figure 4e].
27. With both basal and sub-basal pale bands (28)
— With only sub-basal pale band (29)

28. Basal band narrow and along the entire length of the basal margin: *A. roberti*. BL= 3.0—3.8 (Herrmann and Háva 2020) [Figure 4f]
— Basal band broader and arches from scutellum to outer corner of each elytron: *A. rhodesianus*. BL = 3.0–3.8 (Herrmann 2022) [Figure 5a]. (This colour morph has been treated as a separate species, *A. rhodesianus*, in the past)
29. White hairs forming a line across the anterior half of the pronotum and back from this line to join the hind angles of the pronotum: *A. thunbergi*. BL = 4.0 (Herrmann 2022 (Figure 5b)
— Only pale spots on pronotum with extensive pale patches at hind angles: *A. schawalleri*. BL = 3.7 (Herrmann et al. 2015) [Figure 5c]
30. Basal and sub-basal bands joining to form pale circle in basal half of each elytron (31)
— Broad pale basal and sub-basal bands separated by band of dark hairs: *A. pseudocinereus*. BL = 2.5 (Herrmann and Kadej 2017) [Figure 5d]
31. Pre-apical band narrow, wavy and faint: *A. donckieri*. BL = 2.6–3.0 (Herrmann 2022) [Figure 5e]
— Pre-apical band broad and straight: *A. jucundus*. BL = 4.0–4.5 (Herrmann 2022) [Figure 5f]
32. Basal half of elytra entirely covered in pale hairs: *A. kaniai*. BL = 2.9–3.5 (Herrmann 2022) [Figure 6a].
— Basal half of elytra with some dark hairs (33)
33. Each elytron with one central whitish spot: *A. pellio*. BL = 3.5–6.0 (Herrmann 2022) [Figure 6b]. Not currently on SA list but common and widespread so could be added at a later date.
— More than one spot on each elytron (34)
34. Pre-apical band narrow zig-zag or consisting of separated spots (35)
— Well-defined straight pre-apical band: *A. constantini*. BL = 2.9–3.1 (Herrmann et al. 2015) [Figure 6c]
35. At least small pale patches at elytral apices (36)
— No pale hairs at elytral apices: *A. capronatus*. BL = 3.3 (Herrmann et al. 2015) [Figure 6d]
36. No white band running along the basal margin of elytra (37)
— White band running along inner half of base of each elytron: *A. albonotatus*. BL = 3.4–4.2 (Herrmann et al. 2015) [Figure 6e]
37. The following species cannot be differentiated using (existing) images alone:
- *A. boroveci*. BL = 2.7–3.0 (Herrmann 2022)
- *A. capensis* BL = 3.5–5.0 (Herrmann 2022) [Figure 6f by way of example]
- *A. fasciatopunctatus*. BL = 3.5–5.0 (Herrmann et al. 2015)
- *A. heres* (Háva 2022)
- *A. lambertensis* (Háva 2022)
- *A. miles* (Háva 2022)
- *A. muelleri*. BL = 3.0 (Herrmann et al. 2015)
- *A. orangensis* (Háva 2022)
- *A. snizeki* (Háva 2022)
- *A. wittmeri* (Háva 2022)

Figure 1. Illustrations of ***Attagenus*** species listed in Table 2 with body length (BL) ranges (mm) from Herrmann (2023): a – ***Attagenus diversesignatus*** Pic, 1942. BL = 3.5–5.0; b – ***Attagenus fasciatus*** Thunberg, 1795. BL = 4.3–5.9; c – ***Attagenus rufiventris*** Pic, 1927. BL = 3.7–4.6; d – ***Attagenus pardus*** Arrow, 1915. BL = 3.5–4.5; e – ***Attagenus romani*** Háva, 2016. BL = 3.8; f – ***Attagenus grandjeani*** Pic, 1942. BL = 3.5–4.0.

Figure 2. Illustrations of ***Attagenus*** species listed in Table 2 with body length (BL) ranges (mm) from Herrmann (2023): a – ***Attagenus pustulatus*** Thunberg, 1815. BL = 3.5–4.0; b – ***Attagenus matamata*** Kadej and Háva, 2015. BL = 4.0; c – ***Attagenus holmi*** Kalík and Háva, 2005. BL = 3.5–4.0; d – ***Attagenus aurofasciatus*** Háva, 2005. BL = 3.5–4.0; e – ***Attagenus diversus*** Reitter, 1881. BL = 3.0–4.0; f – ***Attagenus prescutellaris*** Pic, 1927. BL = 3.5–4.0.

Figure 3. Illustrations of *Attagenus* species listed in Table 2 with body length (BL) ranges (mm) from Herrmann (2023): a – ***Attagenus fulvicollis*** Reitter, 1881. BL = 3.0–4.0; b – ***Attagenus hottentotus*** Guérin-Méneville, 1844. BL = 5.0; c – ***Attagenus freyi*** Herrmann et al. 2017. BL = 2.8; d – ***Attagenus flexicollis*** Reitter, 1881. BL = 3.0–4.0; e – A***ttagenus brunneus*** Faldermann, 1835. BL = 2.0–5.0; f – ***Attagenus unicolor*** Brahm, 1791. BL = 2.5–5.5.

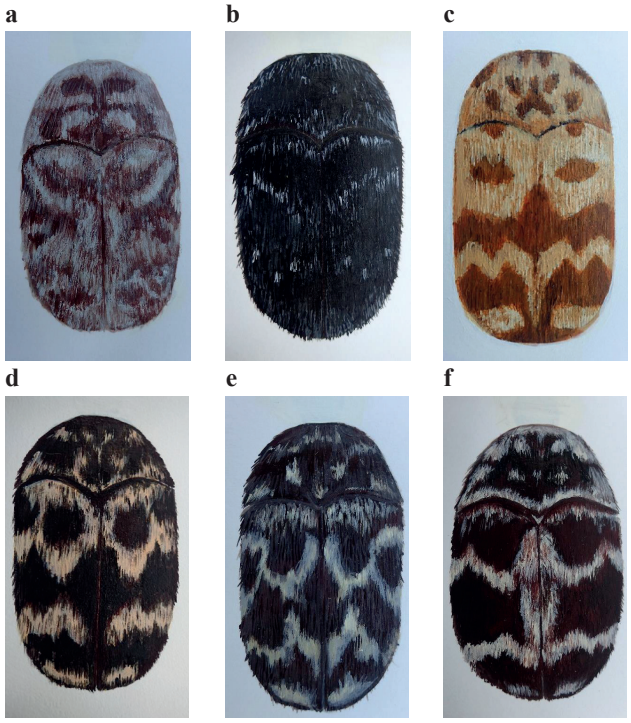

Figure 4. Illustrations of *Attagenus* species listed in Table 2 with body length (BL) ranges (mm) from Herrmann (2023): a – ***Attagenus cinereus*** Thunberg, 1815. BL = 3.5–4.0; b – ***Attagenus pseudocapensis*** Hermann et al. 2015. BL = 3.9–4.4; c – ***Attagenus vestitus*** Klug, 1855. BL = 3.5; d – ***Attagenus danielssoni*** Herrmann et al. 2016. BL = 3.1; e – ***Attagenus leopardinus*** Reitter, 1881. BL = 3.5–5.0; f – ***Attagenus roberti*** Herrmann and Háva, 2020. BL = 3.0–3.8.

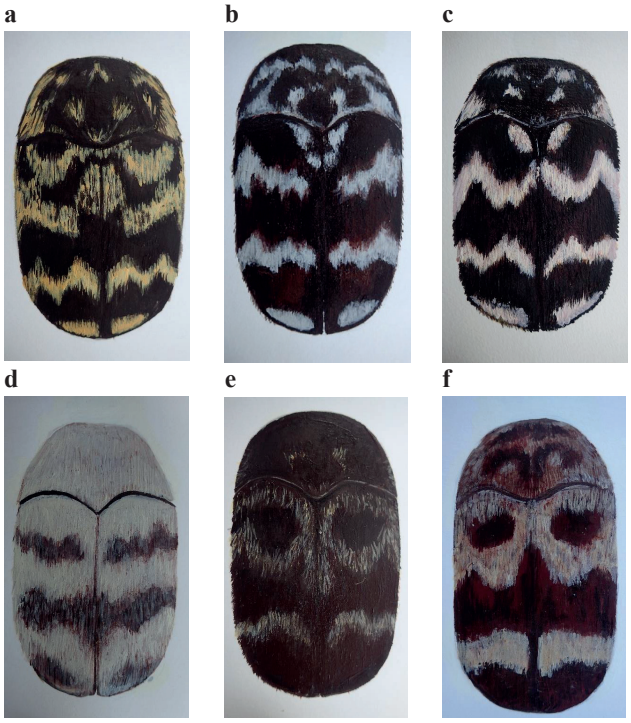

Figure 5. Illustrations of *Attagenus* species listed in Table 2 with body length (BL) ranges (mm) from Herrmann (2023): a – ***Attagenus rhodesianus*** Pic, 1927. BL = 3.0–3.8; b – ***Attagenus thunbergi*** Mroczkowski, 1968. BL = 4.0; c – ***Attagenus schwalleri*** Herrmann et al. 2015. BL = 3.7; d – ***Attagenus pseudocinereus*** Herrmann and Kadej, 2017. BL = 2.5; e – ***Attagenus donckieri*** Herrmann et al. 2015. BL = 2.6–3.0; f – ***Attagenus jucundus*** Péringuey, 1885. BL = 4.0–4.5.

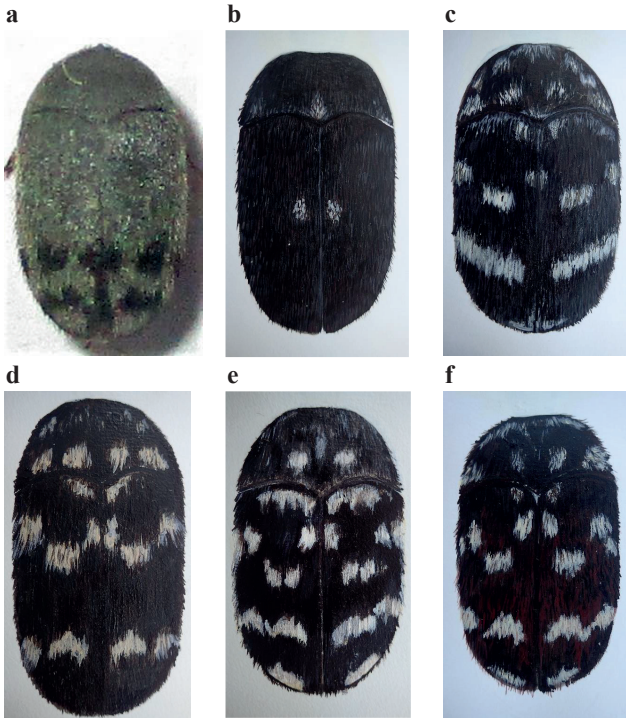

Figure 6. Illustrations of *Attagenus* species listed in Table 2 with body length (BL) ranges (mm) from Herrmann (2023): a – ***Attagenus kaniai*** Háva and Kadej, 2008; b – ***Attagenus pellio*** Linnaeus, 1758. BL = 3.5–6.0; c – ***Attagenus constantini*** Herrmann et al. 2015. BL = 2.9–3.1; d – ***Attagenus capronatus*** Hermann et al. 2015. BL = 3.3; e – ***Attagenus albonotatus*** Pic, 1927. BL = 3.4–4.2; f – ***Attagenus capensis*** Reitter, 1881. BL = 3.4–5.0.

Africa. However, *A. pellio* was not included in Herrmann and Kadej (2017) and no original reference to *A. pellio* in South Africa could be found in the present study. *Attagenus pellio* may be found in South Africa so for convenience the species is included in the identification key but not in the checklist of South African *Attagenus* species presented here. A taxonomic change occurring is that *A. rhodesianus* Pic, 1927, which appeared in the Herrmann and Kadej (2017) list, could be a junior synonym of *A. vestitus* Klug, 1855 according to (Háva 2023).

Attagenus brunneus has been listed as a species of South Africa (Herrmann and Háva 2020), however, no original record could be found to support this. A recommendation to remove *A. brunneus* from the list could be made due to the lack of records supporting the presence of this species in South Africa. Duff (2018) states that a species should be included in a national list if a self-sustaining population exists in the region. With no evidence or records to suggest a population existing in this manner, it is recommended by Holloway (2020a) and Holloway et al. (2019) to exclude such species from national checklists.

A significant issue hindering progress in our understanding of various aspects of Dermestidae is the lack of identification guides. Only two guides exist, Peacock (1993) and Háva (2011), both of which deal with species across very limited geographical ranges (national). Herrmann (2023) displays many images of different species of Dermestidae online but by no means all species. Strangely, little effort has been invested in identification guides (excluding the list by Herrmann 2023, which represents a huge effort). *Attagenus* species are often colourful. Insect orders and families possessing intricate colour patterns, such as Lepidoptera, are identified based on their colour patterns. Keys to most families of Coleoptera rely principally on qualitative characters. Such characters used to differentiate among species are reliable and entirely consistent but often require the use of stereo microscopes to inspect these characters. Modern guides to Lepidoptera rely almost entirely on colour patterns, and most species can be quickly and easily differentiated. Some genera are more difficult and contain species of similar appearance, such as fritillaries (Nymphalidae Rafinesque, 1815) and skippers (Hesperiidae Latreille, 1809). It is well known that insect colour patterns vary depending on seasonal developmental conditions. This has been demonstrated in Lepidoptera (Nylin 1989; Holloway et al. 1993; Holloway and Brakefield 1995; Kemp and Jones 2001; Karl et al. 2009), as well as Diptera (Marriott and Holloway, 1998; Ottenheim et al. 1999; Mielczarek et al. 2016) and Coleoptera (Holloway et al. 1995; Pajni and Airi 2017). Many entomologists would argue that this variation demonstrates the problem with using quantitative characters such as areas of coloured patches and instead seek immutable qualitative characters for identification purposes. These issues do not appear to be recognised as difficulties by students of Lepidoptera (especially for daytime flying butterflies and moths) and new guides continue to be produced based on colour patterns. Some Dermestidae genera show great inter-specific colour pattern variation as illustrated by the images in Herrmann (2023). Some Dermestidae groups are indeed colourful but difficult to differentiate, for example, the *Anthrenus pimpinellae* complex of species (Kadej et al. 2007; Kadej and Háva 2011; Holloway 2019, 2020b, 2021; Holloway and Bakaloudis 2020; Holloway et al. 2020a, b, 2021), but certain other genera contain species that are straightforward to recognize. The *Attagenus* species of South Africa largely fall into the latter category. As illustrated here, most species are quite distinctive. Some are trickier to differentiate, such as species in the *A. capensis* group, but a student of Dermestidae having used the key and established that a species from the *A. capensis* group has been found could consult the material referred to here for more detailed descriptions.

The Dermestidae is a relatively small family of beetles with about 1900 known species (Háva 2023). People find the group attractive judging by the number of images of different Dermestidae species found on citizen science recording sites. For example, there are hundreds of records of different *Attagenus* species from South Africa on iNaturalist (2023). It ought to be a popular group with more people working on various aspects of the family, although many entomologists have a loathing for Dermestidae because of the destructive activities of one species: *Anthrenus verbasci* Linnaeus, 1767. Currently, a small number of workers are generating many small manuscripts largely focussing on faunistics and the reporting of specimens held in public and private entomological collections. If more Dermestid species identification resources were available, it might be possible to encourage more students to work on the family in a collaborative manner to enrich our understanding of the life history, ecology, and taxonomy of this beautiful family of Coleoptera.

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