

# New species and subspecies of *Julodis* Eschscholtz (Coleoptera: Buprestidae) from southern Africa

S.M.V. Gussmann

Department of Zoology and Entomology, University of Pretoria, Pretoria, 0002 South Africa

Six new species and two new subspecies of *Julodis* Eschscholtz, *J. namibiensis*, *J. angolensis*, *J. oweni*, *J. dejagerae*, *J. recenta*, *J. confusa*, *J. eghe kaokoensis* and *J. gariiepina reducta*, from southern Africa are described and illustrated. A new name, *J. turbulenta*, is proposed for one species.

**Key words:** Coleoptera, Buprestidae, *Julodis*, descriptions, southern Africa.

## INTRODUCTION

The genus *Julodis* Eschscholtz is the largest of six genera comprising the subfamily Julodinae (Coleoptera: Buprestidae) (Holm 1979), and it can be divided into two geographically isolated species groups. The northern species group occurs in semiarid to arid areas of mainly the Palaearctic Region, with some species penetrating either the Oriental Region or the Afrotropical Region into western and eastern Africa. The northern species group has not been revised since Kerremans (1905). The southern species group is restricted to semiarid and arid areas of the southwestern Afrotropical Region. This group has received much attention from taxonomists, and by the late 1950s over one hundred names, many infraspecific, had been established following the description of the first southern African *Julodis* species (as *Buprestis fascicularis*) by Linnaeus (1758). The last revision of southern African *Julodis* was by Ferreira & da Veiga-Ferreira (1958). These authors recognized 26 species, 16 subspecies, 34 variations and four aberrations. A recent revision was undertaken with the aim of elucidating the classification of southern African *Julodis* (Gussmann 1994) and this resulted in the recognition of 27 species and 12 subspecies, including the nominal taxa. The purpose of this paper is to validate the names of six new species and two new subspecies and to propose a new name for one species.

The importance of genitalia as a morphological character was underestimated by earlier taxonomists, and much emphasis is now placed on features of the male genitalia to identify species and subspecies. The aedeagus proved to be a reliable character in all southern African *Julodis*,

whereas the structure of the female ovipositor is highly variable and rarely species-specific.

Intraspecific morphological variation was detected by examining all accumulated material and associated locality data from the geographical ranges of the respective species.

Host plant information is provided for adults only as larvae of southern African species are unknown.

Material examined is deposited in the following collections: A. Joubert Collection, Somerset West (AJCS); The Natural History Museum, London (BMNH); National Museum, Bloemfontein (BMSA); C.R. Owen Collection, Somerset West (COCS); Deutsches Entomologisches Institut, Eberswalde (DEIC); D.S. Verity Collection, Los Angeles (DSVC); Field Museum of Natural History, Chicago (FMNH); G.H. Nelson Collection, Pomona, California (GHNC); Institut Royal des Sciences Naturelles de Belgique, Bruxelles (ISNB); Muséum National d'Histoire Naturelle, Paris (MNHN); Musée Royal de l'Afrique Centrale, Tervuren (MRAC); R.L. Westcott Collection, Salem, Oregon (RLWE); South African Museum, Cape Town (SAMC); South African National Collection of Insects, Pretoria (SANC); Staatliches Museum für Tierkunde, Dresden (SMTD); State Museum of Namibia, Windhoek (SMWN); Transvaal Museum, Pretoria (TMSA); TN. de Sainval Collection, Bruxelles (TSCB); U. Nylander Collection, Valbo (UNCS); National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); Museum für Naturkunde der Humboldt-Universität zu Berlin (ZMHB); Zoologische Staatssammlung München (ZSMC).

## Morphology of *Julodis*

The external morphology of *Julodis* has been treated by Kerremans (1905), Ferreira & da Veiga-Ferreira (1958) and Holm (1979). However, various features relevant to the following descriptions require elucidation. A diagram of a *Julodis* (Fig. 1) illustrates many of these external morphological characters and the relevant terminology.

**Body length.** The mean and ranges in body length are given in the descriptions. The dimension measured extended from the head (between the eyes) to the tip of the elytron. Species of *Julodis* show a greater size variability at the intraspecific level than they manifest between species, except for *J. bennigseni* Obst which is rarely longer than 16 mm. Females are generally larger and slightly more robust than males.

**Pulverulence.** All species secrete a waxy substance through pores in the integument, which accumulates around the pores or adheres to the setae as filaments or clumps. This substance, because of its powder-like appearance, is referred to as pulverulence and setae which are covered with it are pulverulent setae. The colour of the pulverulence and the area of the body to which a particular colour is restricted are often diagnostic. Unfortunately the colours, especially the darker hues (orange, red) often fade in preserved specimens to almost greyish-white. Great care should be exercised when the colour of pulverulence is used as a diagnostic character. The chemical composition of the pulverulence is unknown. The elytra of three *Julodis* species were examined by P. Nagel at the Institute of Biogeography, Centre for Environmental Research, University of Saarland, Germany. Scanning electron micrographs showed that the morphology of the waxy substance is very similar, if not the same, as that of 'wax blooms' in some desert Tenebrionidae (Coleoptera) from the Namib (McClain & Gerneke 1990; Nagel, pers. comm.).

**Setation.** All species are setose but the length of setae varies considerably, either interspecifically or often intraspecifically. If the setae are long they are also erect, but if they are very short they are often curved or recumbent, a character used in the descriptions. Ventral setation, by contrast, is only referred to as 'long', 'moderately long' or 'short', where 'long' means longer than the width of the fourth visible abdominal sternum at the midline, 'moderately long' means shorter than width but not shorter than half the width of the fourth visible

abdominal sternum at the midline and 'short' is shorter than half the width of the fourth visible abdominal sternum. Ventral setae are erect unless otherwise stated. Setae are never all equally long and it was impractical to describe or measure all setae. Most but not all setae are expected to fall within the described limits. The dorsal colour illustrations of the species and subspecies also depict the distribution and density of setae. Setation of the tibiae is used as a character as well. All species have short tibial setation, *i.e.* not longer than the mid-tibial diameter of the respective tibia. In some of the species, however, some setae are always significantly longer than the mid-tibial diameter. The ratio between setal length and mid-tibial diameter of the respective tibia is the same for the pro-, meso- and metatibiae.

**Integument sculpture and distribution of pulverulence.** The terms 'puncture', 'isolated puncture', 'cluster of punctures', 'fovea', 'isolated fovea' and 'groove' are used to describe the integument sculpture (Fig. 1). A puncture is a round depression (varying interspecifically in depth and in size) consisting of one pore which bears a single seta. The term 'clusters of punctures' only refers to the sculpture of the abdominal sterna in contrast to distinct 'isolated punctures'. In this case a number of punctures are so closely spaced that they form a shallow but not sharply defined depression, creating a wavy pattern. The terms 'fovea' and 'groove' are mainly applied to the sculpture of the pronotum and elytron. Fovea refers to a sharply defined depression which contains a number of densely spaced punctures, and foveae are variable in size and shape (round to square, elongate, irregular). On the elytron the largest foveae always bear densely pulverulent setae arranged in longitudinal rows. In between these distinctly 'larger foveae' are 'smaller interstitial foveae' and punctures, both with the pulverulence mostly weak or absent. The basic pattern consists of five rows of larger foveae and an additional elongate (sometimes transversely interrupted) basosutural fovea (Fig. 1). The terminology used for the pronotum is similar to that for the elytron. The arrangement of 'isolated foveae' and foveae 'merging into continuous or discontinuous (longitudinal) grooves' is important. In the different species, foveae either do not merge into grooves and are approximately regularly spaced, or form five longitudinal bands of foveae merged into grooves (a median band, two lateral bands and two medial bands between

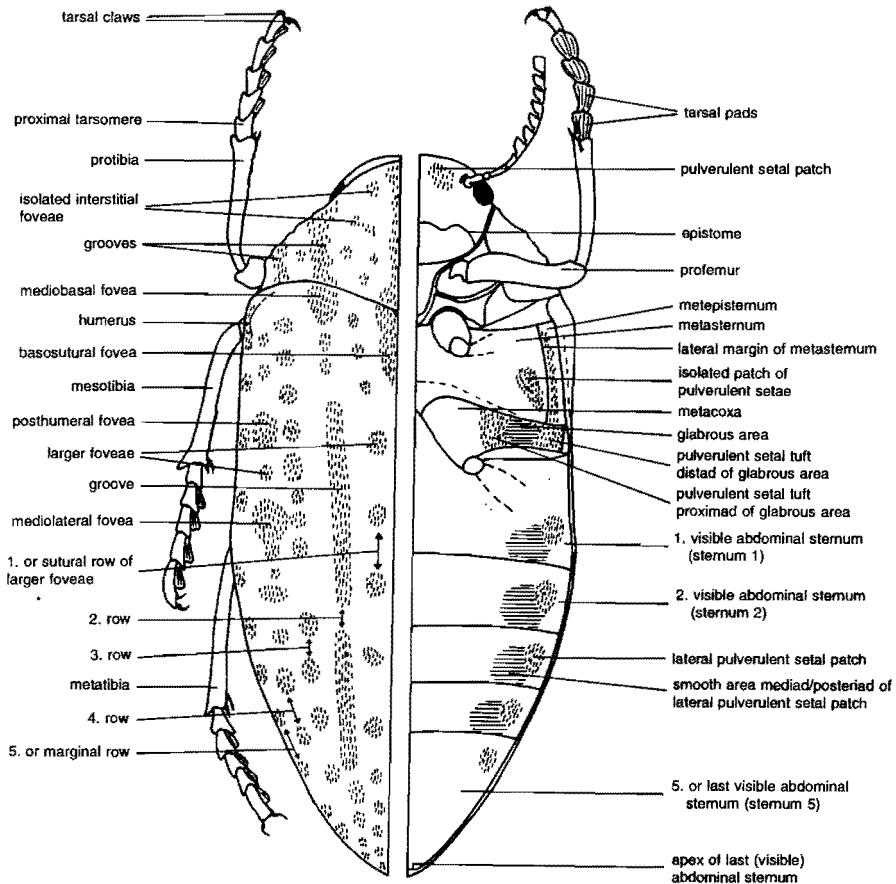


Fig. 1. Morphological characters of a generalized *Julodis* (left: dorsal aspect; right: ventral aspect).

the median band and the lateral bands) (*J. confusa* sp. n.) or foveae merge into grooves only anteromedially and laterally (*J. oweni* sp. n.). The head, like the pronotum, is rather coarsely sculptured with deep foveae, rarely becoming strongly sulcate. The most important diagnostic character is the presence or absence and general distribution of pulverulence. Five abdominal sterna are visible and only these sterna are discussed (Fig. 1). They bear characters such as sculpturing, but the size and spacing of isolated punctures and/or clusters of punctures may vary considerably within species, even on single individuals (described as 'irregular'). A more useful character is a lateral pulverulent setal patch usually present on each sternum (Fig. 1). This patch is generally round, at least on sterna 1-4, but is sometimes oval or oblique, and often oval and elongate on sternum 5. On sterna 2-4 the patch is situated almost in the middle of the

sternum. The diameter of this patch, measured along its midline, compared to the length of the respective sternum, measured where the patch is situated, may differ significantly between species. The apex of the last abdominal sternum (Fig. 1) in males is also a useful character in a number of species, but is invariably truncate in females and therefore unsuitable for identification. In males, the apex differs between species and may be truncate (*J. angolensis* sp. n.), slightly concave (*J. turbulenta* nom. n.), bilobed (*J. confusa*), relatively broad and slightly concave (*J. caffer* Laporte) or triangularly incised (*J. fascicularis*), with very little intraspecific variation. The apex is usually triangularly incised or relatively broad and slightly concave in aedeagi with a complex structure.

**Genitalia.** The female genitalia of southern African *Julodis* are insignificant for identification and are not considered. The male genitalia are

important for the differentiation of species and each description is accompanied by a drawing of the aedeagus. The terminology is that of Lindroth & Palmén (1970). The tegmen of the strongly sclerotized aedeagus always comprises a basal piece and a pair of basally fused and apically free parameres. These structures are not segmented but completely fused. The tube, formed by the fused part of the parameres, opens ventrally, usually where the parameres become separated. The penis is inserted in the tegmen through this opening and membranously attached to it. To illustrate the penis it was detached by removing the membranes. The shape of the tegmen (mainly dorsal and ventral) and the length and width of the free part of the parameres compared to the length and width of the fused part of the parameres, as well as modifications of the apex of the parameres (*cf.* Figs 25, 29) are diagnostic for each species. The penis is rather simple in structure in the majority of species and is parallel-sided (Figs 12, 22, 36), while it is flat in lateral view. Slight deviations from this basic shape, including the shape of the apophyses, should be disregarded as the penis, being a delicate structure, tends to deform slightly when it dries after dissection. The penis may or may not have transparent, membranous areas (Figs 16, 17, 22, 23), but the absence or presence and size of these areas vary intraspecifically. The penis is, however, significantly modified and complex in species such as *J. recenta* sp. n. and *J. fascicularis* (Figs 16, 17, 30, 31). In lateral view the penis is not flat. These species also have an additional sclerotized appendage which is ventrally attached by membranes to the apex of the penis. This sclerotized piece differs in shape between species and may be tuberculate (as in *J. recenta*, Figs 18, 19). Species which share identical or very similar aedeagi (*e.g.* *J. mitifica* Boheman and *J. desertica* Ferreira & da Veiga-Ferreira, or *J. albomaculata* (Voet), *J. oweni* and *J. dejagerae* sp. n.) differ clearly in other morphological characters. They are also allopatric and easily distinguished.

Label data for type specimens are cited verbatim. Map coordinates and other data are added in brackets.

#### ***Julodis namibiensis* sp. n.**, Figs 2–5, 42, 45

##### **Description**

**Body length.** 20.8 mm (holotype ♂), 22.2 mm (paratype ♀).

**Colour of integument.** Dorsum with head and pronotum black, elytron mid-brown to dark-brown; venter black with weak metallic reflections, grading into dark-brown on metacoxa, metasternum, metepisternum and prosternum; legs slightly darker-brown than elytron.

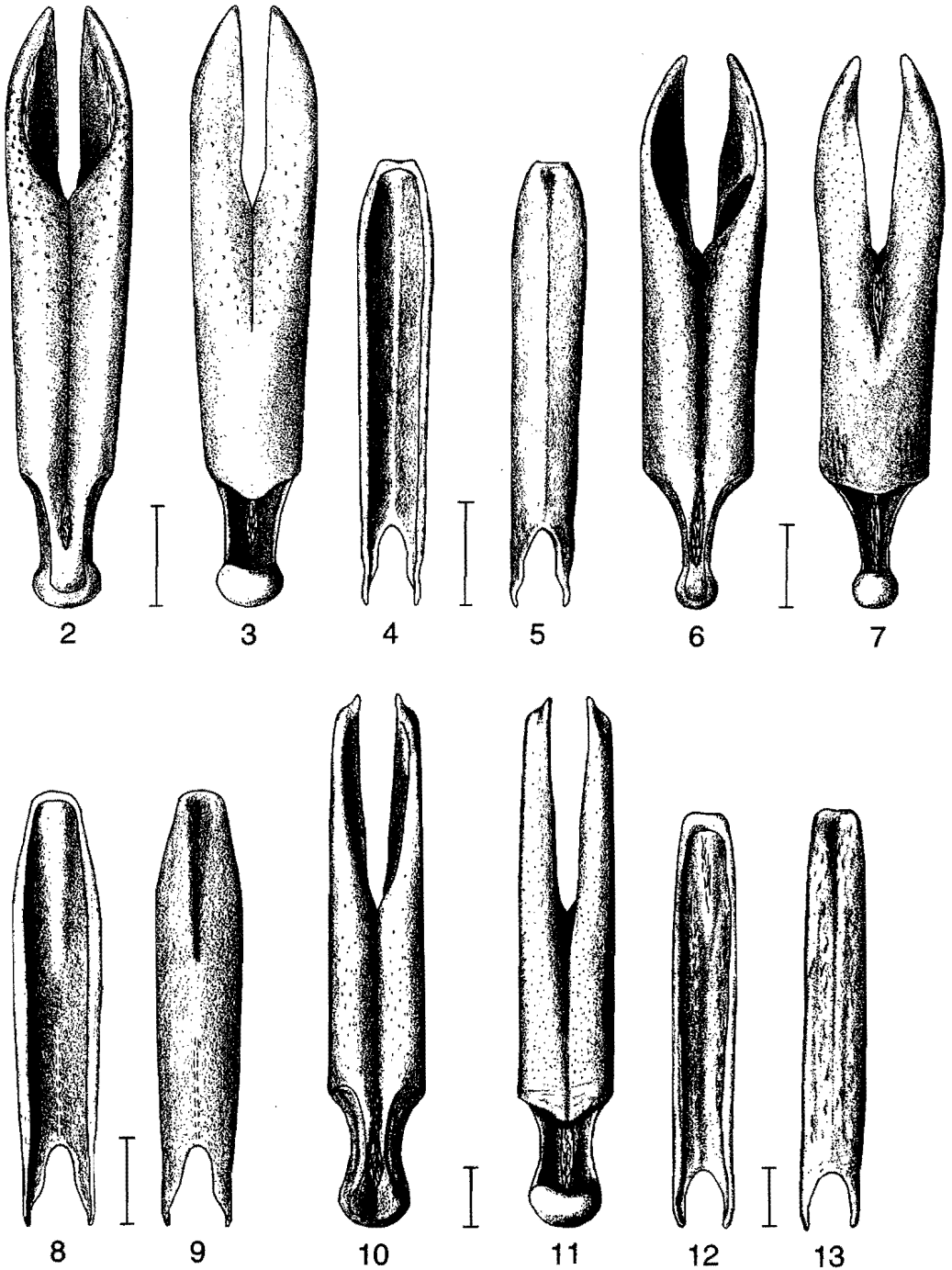
**Colour of pulverulence.** Yellowish-white but brownish-yellow on pronotum and on setal patches in elytral marginal row.

**Head.** Setae recumbent, shorter than half width of eye; setae pulverulent on whole frons; bilateral longitudinal, unsculptured, irregular, shiny ridges present on vertex.

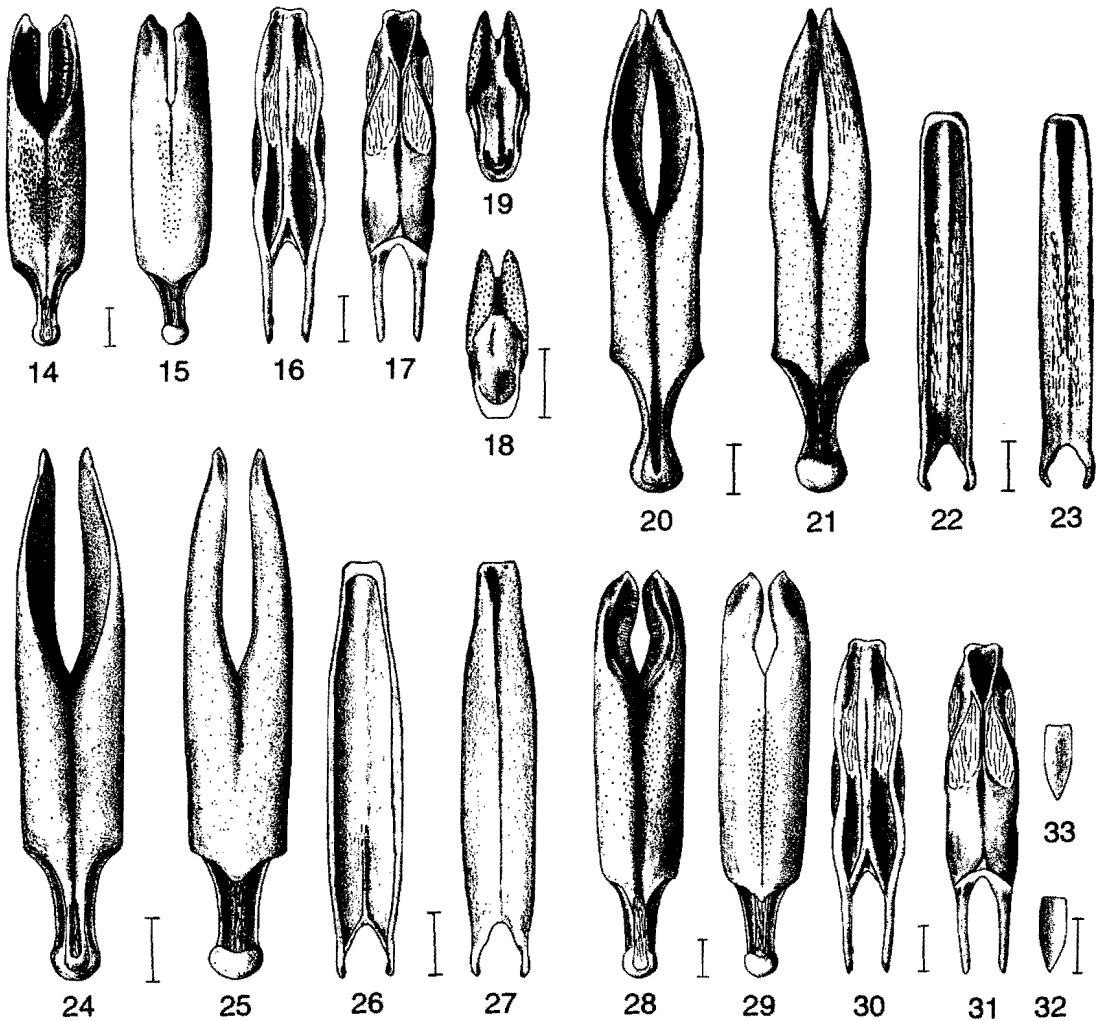
**Thorax. Pronotum:** setae recumbent, shorter than half width of eye; with seven longitudinal bands of foveae merging into mostly continuous, broad grooves and bearing densely pulverulent setae; surface with six smooth longitudinal areas between grooves, bearing only a few small isolated foveae; lateral-most area limited to posterior half of pronotal length. **Elytron:** setae recumbent, shorter than half width of eye; larger foveae fairly regularly spaced, round to square, arranged in five rows and bearing densely pulverulent setae; smaller interstitial foveae bearing less densely pulverulent setae; costae narrow, discernible along entire elytral length. **Ventral setation:** short, recumbent, not dense. **Hypomeron:** mid-area beyond lateral pronotal margin with densely pulverulent setae not forming a tuft. **Metasternum:** with pulverulence. **Metepisternum:** pulverulence variable but dense at least in ventral half of metepisternal length. **Legs:** tibial setae not longer than mid-tibial diameter; metatibia with densely spaced large punctures dorsally; tarsal pads dark dorsally. **Metacoxa:** posterointernal angle aspinose; median section with glabrous area (hardly discernible in paratype) irregularly shaped and limited to anterior margin, with posterior margin not produced into a lobe; densely pulverulent setae proximad, distad and posteriad of glabrous area.

**Abdominal sterna.** With clusters of punctures, irregular in size and widely spaced, markedly larger laterally on sterna 1–5, with very few additional isolated punctures; pulverulence on all isolated punctures and clusters of punctures; apex of last sternum truncate in male. **Male genitalia:** as in Figs 2–5.

**Type material examined.** Holotype ♂, NAMIBIA: South West Africa, Gobabeb (23.33S 15.02E), 25.iv.1979, Wharton (TMSA). Paratype ♀,



**Figs 2–13.** 2–5: Aedeagus of *Julodis namibiensis*. 2, tegmen, ventral view; 3, tegmen, dorsal view; 4, penis, ventral view; 5, penis, dorsal view. 6–9: Aedeagus of *J. angolensis*. 6, tegmen, ventral view; 7, tegmen, dorsal view; 8, penis, ventral view; 9, penis, dorsal view. 10–13: Aedeagus of *J. oweni* and *J. dejagerae*. 10, tegmen, ventral view; 11, tegmen, dorsal view; 12, penis, ventral view; 13, penis, dorsal view. Scale bars = 1 mm.



**Figs 14–33.** 14–19: Aedeagus of *Julodis recenta*. 14, tegmen, ventral view; 15, tegmen, dorsal view; 16, penis, ventral view; 17, penis, dorsal view; 18, appendage of penis, ventral view; 19, appendage of penis, dorsal view. 20–23: Aedeagus of *J. confusa*. 20, tegmen, ventral view; 21, tegmen, dorsal view; 22, penis, ventral view; 23, penis, dorsal view. 24–27: Aedeagus of *J. turbulenta*. 24, tegmen, ventral view; 25, tegmen, dorsal view; 26, penis, ventral view; 27, penis, dorsal view. 28–33: Aedeagus of *J. fascicularis*. 28, tegmen, ventral view; 29, tegmen, dorsal view; 30, penis, ventral view; 31, penis, dorsal view; 32, appendage of penis, ventral view; 33, appendage of penis, dorsal view. Scale bars = 1 mm.

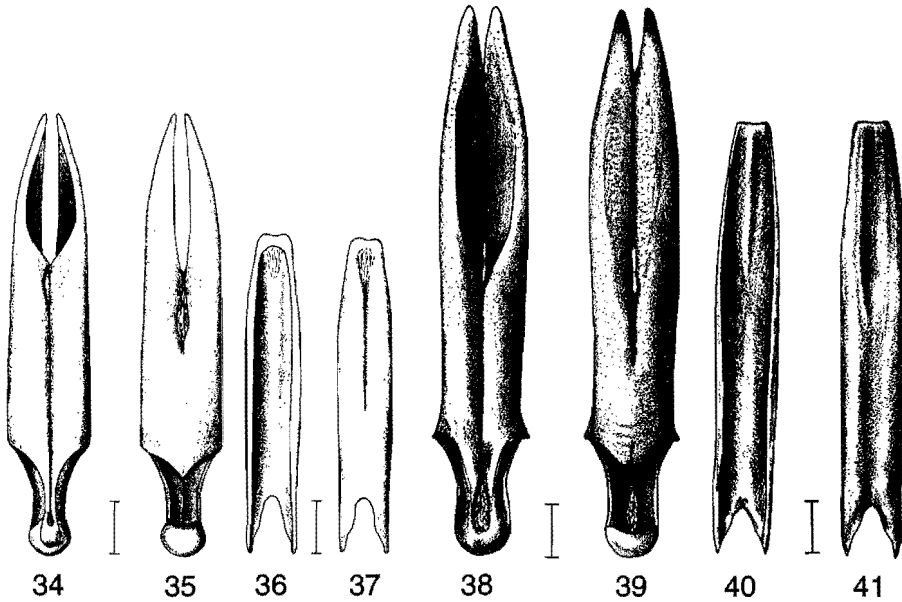
**NAMIBIA:** Upper Ostrich Gorge, 22.29S 14.59E, Swakopmund Dist., 9 April–6 May 1985, J. Irish, H. Rust / H62812 (SMWN).

**Etymology.** Named after Namibia, provenance of the type material.

**Distribution** (Fig. 42). Known only from Gobabeb and the Upper Ostrich Gorge near Swakopmund.

**Remarks.** The species is distinct: the head has bilateral longitudinal, unsculptured, shiny ridges

on the vertex; the pronotum has five smooth longitudinal areas between broad grooves (paratype illustrated in Fig. 45) and the elytron has discernible narrow costae. The colour of the integument, the short, recumbent setation and the male genitalia are also distinctive. The colour of the pulverulence of the holotype has faded slightly. The holotype and paratype are otherwise very similar except for size.



**Figs 34–41.** 34–37: Aedeagus of *Julodis egho kaokoensis*. 34, tegmen, ventral view; 35, tegmen, dorsal view; 36, penis, ventral view; 37, penis, dorsal view. 38–41: Aedeagus of *J. gariepina reducta*. 38, tegmen, ventral view; 39, tegmen, dorsal view; 40, penis, ventral view; 41, penis, dorsal view. Scale bars = 1 mm.

***Julodis angolensis* sp. n.**, Figs 6–9, 42, 46

**Description**

*Body length.* 24.0 mm (holotype).

*Colour of integument.* Uniformly black with weak purplish-blue iridescence.

*Colour of pulverulence.* Creamy-white but darker between eyes on head and on pronotal sides.

*Head.* Setae shorter than half width of eye and mostly curved; setae densely pulverulent in two larger foveae between eyes.

*Thorax. Pronotum:* setae recumbent, shorter than half width of eye; with foveae small, round, regularly and well spaced but considerably larger and confluent on sides, bearing pulverulent setae.

*Elytron:* setae recumbent, shorter than half width of eye; larger foveae small, regularly and widely spaced, arranged in five rows and bearing densely pulverulent setae; interstitial foveae only slightly smaller, bearing weakly pulverulent setae. *Ventral setation:* short, curved, well-spaced. *Hypomeron:* mid-area beyond lateral pronotal margin with pulverulent setae not forming a tuft. *Metasternum:* pulverulence weak. *Metepisternum:* pulverulence dense on entire surface. *Legs:* tibial setae not longer than mid-tibial diameter; metatibia with

densely spaced punctures dorsally; tarsal pads dark dorsally. *Metacoxa:* posterointernal angle aspinose; median section with poorly defined glabrous area, with posterior margin not produced into a lobe; proximad of glabrous area with small clusters of punctures bearing pulverulent setae and intruding onto glabrous area; distad of glabrous area with well-defined pulverulent setal patch.

*Abdominal sterna.* With small, non-pulverulent and weakly pulverulent, well-spaced clusters of punctures; each sternum with lateral, more densely pulverulent setal patch, diameter of patch on sterna 2–4 approximately one third of sternum length; apex of last sternum truncate in male. *Male genitalia:* as in Figs 6–9.

*Type material examined.* Holotype ♂, ANGOLA: Moçamedes, Pedras Aguas (ca. 14.59S 12.33E), 18.v.1974 / H19671 (SMWN).

*Etymology.* Named after Angola, provenance of the holotype.

*Distribution* (Fig. 42). Known only from the type locality.

*Remarks.* *Julodis angolensis* can be readily distinguished from the other two sympatric species, *J. egho* Gory and *J. bennigseni*, and all other species

by the different sculpture, the setation and the distinctive male genitalia.

***Julodis oweni* sp. n.**, Figs 10–13, 42, 47

**Description**

*Body length.* 23.1–28.7 mm; mean 25.8 mm ( $n = 6$ ).

*Colour of integument.* Dorsum, venter and legs black with a faint brownish-bronze gloss.

*Colour of pulverulence.* Uniformly creamy-white to pale-yellow.

*Head.* Setae erect, non-pulverulent, majority longer than half width of eye.

*Thorax. Pronotum:* setae erect, majority longer than half width of eye; with foveae anteromedially, and laterally in anterior one third to half of pronotal length merging into continuous or discontinuous grooves bearing densely pulverulent setae, with small, densely spaced distinct foveae bearing non-pulverulent setae. *Elytron:* shortest setae erect, longer than half width of eye; with longest setae erect, sparse (majority along suture and near base), much longer than half width of eye; larger foveae widely spaced, small, rounded, arranged in five rows and bearing densely pulverulent setal tufts; smaller interstitial foveae bearing non-pulverulent setae. *Setation of venter:* long, moderately dense. *Hypomeron:* mid-area beyond lateral pronotal margin with small pulverulent setal tuft. *Metasternum:* without pulverulence. *Metepisternum:* with band of pulverulent setae in ventral half of metepisternal length. *Legs:* some tibial setae always longer than mid-tibial diameter; metatibia with punctures moderately densely spaced dorsally and slightly larger laterally; tarsal pads dark dorsally. *Metacoxa:* posterointernal angle aspinose; median section with large glabrous area not reaching posterior margin, the latter not produced into a lobe; with pulverulent setal tufts proximad and distad of glabrous area.

*Abdominal sterna.* With fairly large, moderately densely spaced isolated punctures; each sternum with well-defined lateral pulverulent setal patch, diameter of patch on sterna 2–4 approximately a quarter to one third of sternum length; area mediad/posteriad of lateral patch on sterna 1–4 apunctate or sparsely punctured, smooth; apex of last sternum weakly concave in male. *Male genitalia:* as in Figs 10–13.

*Type material examined.* Holotype ♂, SOUTH AFRICA: Cape, Sutherland, 32.23S 20.39E, 27.x.1991, C.R. Owen (TMSA). Paratypes: 1♂, 2♀

(COCS), 1♀ (AJCS), 1♀ (TMSA), 1♀ (UNCS), 1♂ (TSCB), same data as holotype, 1♂, same data but 25.x.1991 (TMSA).

*Etymology.* Named after the collector, C.R. Owen.

*Distribution* (Fig. 42). All specimens were collected near Sutherland in the Karoo (Owen, pers. comm.)

*Remarks.* *Julodis oweni* can easily be distinguished from other species by the following characters: the integument is black with a faint brownish-bronze sheen; the pulverulence is uniformly creamy-white to pale-yellow; the setae on the head are all non-pulverulent; the larger elytral foveae are widely spaced, small, round and bear densely pulverulent setal tufts, and the majority of dorsal setae are extremely long. The holotype is illustrated in Fig. 47.

Identical male genitalia occur in *J. albomaculata* and *J. dejagerae*. *Julodis oweni* is nevertheless considered a separate species because of its allopatric distribution and distinctly different external morphology.

***Julodis dejagerae* sp. n.**, Figs 10–13, 42, 48

**Description**

*Body length.* 24.3 mm (holotype ♂).

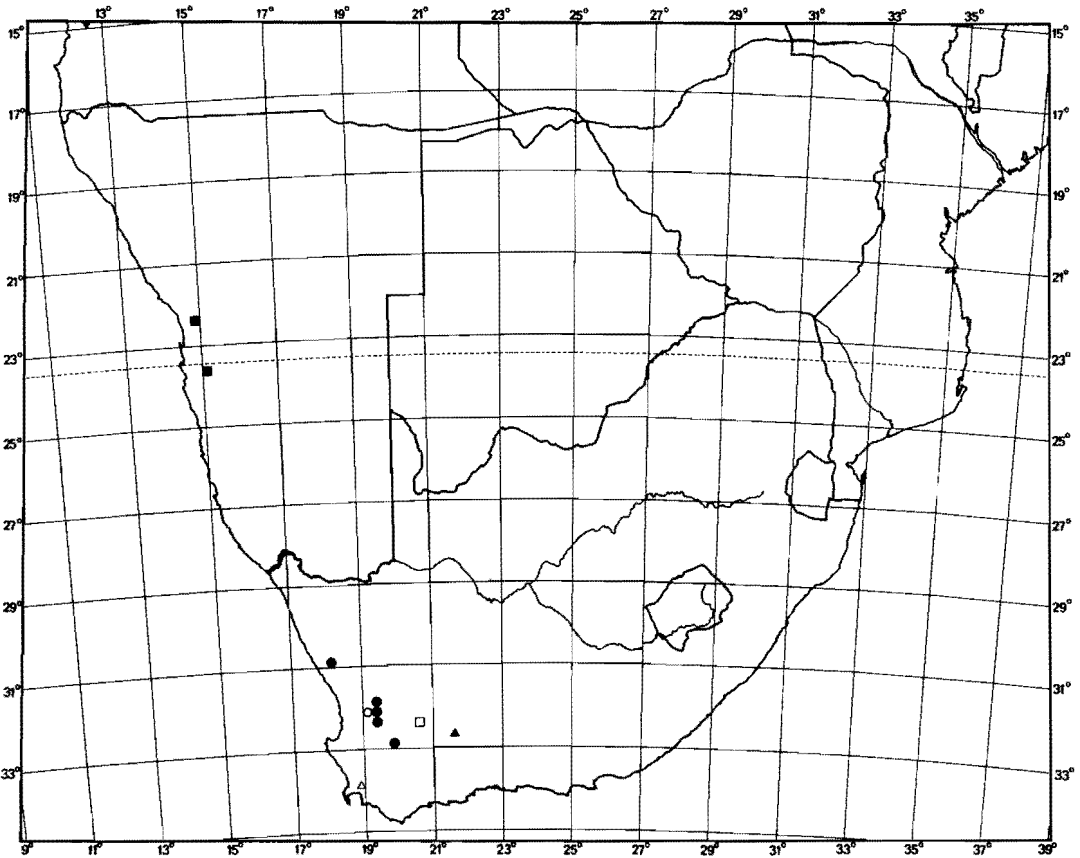
*Colour of integument.* Black with very faint iridescence.

*Colour of pulverulence.* White, but deep-red on head and setal patches in marginal elytral row.

*Head.* Setae erect, both shorter and longer than half width of eye; with pulverulent setae between eyes in small bilateral tufts.

*Thorax. Pronotum:* setae erect, both shorter and longer than half width of eye; with foveae anteromedially and laterally merging into continuous or discontinuous grooves with dense pulverulence; isolated foveae irregular in size and spacing, with weak pulverulence. *Elytron:* shortest setae erect, shorter than half width of eye; longest setae erect, sparse along suture and in anterior quarter of elytral length and longer than half width of eye; larger foveae widely spaced, round, arranged in five rows and bearing densely pulverulent setal tufts; smaller interstitial foveae with sparse, weakly pulverulent and non-pulverulent setae. *Setation of venter:* long, moderately dense. *Hypomeron:* mid-area beyond lateral pronotal margin with pulverulent setae not forming a tuft. *Metasternum:* pulverulence weak, mostly concentrated in posterolateral corner. *Metepisternum:*





**Fig. 42.** Recorded distributions of *Julodis namibiensis* ■, *J. oweni* □, *J. dejagerae* ▲, *J. recenta* ●, both *J. recenta* and *J. confusa* ○, *J. turbulenta* △, *J. angolensis* ▼.

pulverulence dense on entire surface. *Legs*: some tibial setae always longer than mid-tibial diameter; metatibia with punctures moderately densely spaced dorsally and slightly larger laterally; tarsal pads dark dorsally. *Metacoxa*: posterointernal angle aspinose; median section with large glabrous area not reaching posterior margin, the latter not produced into a lobe; with pulverulent setal tufts proximad and distad of glabrous area.

*Abdominal sterna*. With fairly large, moderately densely arranged distinct punctures; each sternum with larger lateral pulverulent setal patch and with smaller pulverulent setal patches along lateral margin, diameter of larger patch on sterna 2–4 approximately half of sternum length; area mediad/posteriad of larger patch on sterna 1–4 sparsely punctured, smooth; apex of last sternum weakly concave in male. *Male genitalia*: as in Figs 10–13.

*Type material examined*. Holotype ♂, SOUTH AFRICA: Cape, Merweville, SE 32 21 Da (32.40 21.31E), 19.xii.1991, M. de Jager (SANC).

*Etymology*. Named after the collector, M. de Jager (Plant Protection Research Institute, Middelburg).

*Distribution* (Fig. 42). Known only from the type locality.

*Remarks*. Characters such as colour of the integument, colour of the pulverulence and length of the setation are sufficient to identify *J. dejagerae*. The species vaguely resembles some *J. c. chevrolatii* Laporte specimens with similar integumental colour and pulverulence. These specimens may, however, be distinguished from *J. dejagerae* as follows: the pronotum with foveae merging into five longitudinal continuous or discontinuous grooves (compared with foveae merging into continuous or discontinuous grooves only antero-medially and laterally); the larger elytral foveae

densely spaced (compared with widely spaced); and each abdominal sternum with a single, well-defined lateral pulverulent setal patch (compared with each abdominal sternum with a larger lateral pulverulent setal patch and additional smaller pulverulent setal patches along lateral margin).

***Julodis recenta* sp. n.**, Figs 14–19, 42, 49

**Description**

*Body length.* 22.5–29.5 mm; mean 25.6 mm ( $n = 19$ ).

*Colour of integument.* Dorsum and legs black with metallic-golden-bronze sheen, elytral margin greenish-blue; venter black with faint purplish iridescence.

*Colour of pulverulence.* Male uniformly yellow to pale-yellow; female white to creamy-white but darker (pale-yellow to yellow) on pronotum, setal patches in marginal elytral row and on venter (Fig. 49).

*Head.* Setae erect, non-pulverulent, majority longer than half width of eye.

*Thorax. Pronotum:* setae erect, majority longer than half width of eye; five longitudinal bands of foveae merging into continuous or discontinuous grooves, the two lateral grooves limited to anterior half of pronotal length; grooves with dense, isolated foveae with less dense pulverulence. *Elytron:* shortest setae erect, grading to recumbent towards apex, shorter than half width of eye; longest setae on entire surface erect, much longer than half width of eye; larger foveae regularly spaced, round, arranged in five rows and bearing densely pulverulent setal tufts; smaller interstitial foveae bearing sparser, weakly pulverulent setae. *Setation of venter:* long, dense. *Hypomeron:* mid-area beyond lateral pronotal margin with pulverulent setal tuft. *Metasternum:* without pulverulence, very rarely with a distinct isolated patch of weakly pulverulent setae near lateral margin. *Metepisternum:* without pulverulence. *Legs:* some tibial setae always longer than mid-tibial diameter; metatibia with sparse punctures dorsally, these sometimes more densely spaced in proximal third of tibial length; tarsal pads dark dorsally. *Metacoxa:* postero-internal angle aspinose; median section with glabrous area often limited to anterior third to half of metacoxal width, with posterior margin not produced into a lobe; with densely pulverulent setal tuft distad and non-pulverulent (rarely weakly pulverulent) setae proximad of glabrous area.

*Abdominal sterna.* With fine and densely spaced isolated punctures; each sternum with well-defined lateral pulverulent setal patch, but usually absent on sternum 1, diameter of patch on sternum 2–4 approximately one fifth of sternum length; apex of last sternum moderately incised in male. *Male genitalia:* as in Figs 14–19.

*Type material examined.* Holotype ♂, SOUTH AFRICA: R.S.A., Cape: Pakhuis Pass, SE 32 19 Aa (32.08S 19.01E), x.1991, C.R. Owen (TMSA). Paratypes: 1♂, 1♀ (BMNH), 1♂ (TMSA), 3♀ (COCS), same data as holotype; 2♀, same data but ix.1989 (COCS); 1♂, same data but vii.1990 (AJCS); 4♂, 4♀ (SANC); 1♂, 3♀ (TMSA), Botterkloof Pass, C.P., S.Afr., 56 km S Nieuwoudtville (31.50S 19.16E), 27.ix.1972, H.D. Brown, E. Koster, A. Prinsloo/H.P. *Elytropapas* (!) (*Elytropappus*): 1♂, 2♀ (SANC), 2♀ (TMSA), Doorn River (exact locality 'Uitspankraal' (H.D. Brown, pers. comm.)) C.P., S.Afr., 32 km NE Wuppertal (32.02S 19.25E), 27.ix.1972, H.D. Brown, E. Koster, A. Prinsloo; 1♂, 2 km W Rietpoort (30.58S 18.05E), C.P., S.Afr., 29.ix.1972, H.D. Brown, E. Koster, A. Prinsloo (SANC); 1♀, South Africa, CP Clanwilliam Dist, Biedouw Valley (Bidouw Farm), 32.08S 19.14E, 7.ix.1987, M.W. Mansell (SANC); 1♀, Doringriver Heights, 42 km NE Wuppertal (31.572S 19.23E), C.P., S.Afr., 27.ix.1972, H.D. Brown, E. Koster, A. Prinsloo (TMSA); 2♂, 1♀ (AJCS), 5♂, 2♀ (TMSA), 14♀ (COCS), 1♂, 1♀ (MRAC), 1♂ (FMNH), 1♂ (USNM), 1♂ (MNHN), 1♂ (SAMC), 1♂, 1♀ (TSCB), R.S.A., Cape: ca. 25 km N of Inverdoorn on road to Calvinia, SE 32 19 Dd (32.53S 19.46E), 10.x.1993, C.R. Owen; 1♂, South Africa, Cape Prov., Botterkloof Pass, top of, Sept.13, 1972, 31 19 Cd (31.50S 19.16E), 2230 ft., ME & BJ. Irwin, white sand dune assoc. (GHNC); 1♀, S.Afr.: W Cape, Botterkloof Pass 8 km N, 31.48S 19.16E, 25.ix.1994: E-Y: 3042, flowers & vegetation, leg. CL Bellamy (TMSA); 1♂, S.Afr., WCape, Cedarberg, Oukraal, 32.25S 19.25E, 2.ix.1979, E-Y: 1630, sandblown mts., leg. Endrödy-Younga (TMSA); 1♀, Hex River, Oct. / *Julodis albomaculata* V. (SANC).

*Etymology.* The species name reflects that, with one exception, all specimens were recently collected, i.e. since the last study on this species group by Ferreira & da Veiga-Ferreira (1958).

*Distribution.* Figure 42 shows a rather wide gap between the northernmost locality (one specimen from Rietpoort) and all remaining localities northeast, east and southeast of the Cedarberg Mountains.

*Remarks.* Although many specimens of *J. recenta*

have been found among material of other species, it can be distinguished by the following characters: the head, metasternum and metepisternum without pulverulence (metasternum very rarely with isolated patch of weakly pulverulent setae); the metacoxa with a densely pulverulent setal tuft only distad of the glabrous median area (setae proximad of the glabrous median area rarely weakly pulverulent) and the colour of integument and pulverulence. Recently collected and well-preserved material clearly shows sexual dimorphism in the colour of the pulverulence. The species is morphologically uniform with little variation. Sympatric populations of *J. fascicularis* superficially resemble *J. recenta* but the combination of external morphological characters and the distinctly different male genitalia (cf. Figs 14–19 and 28–33) justify the recognition of *J. recenta* as a separate species.

Specimens have been recorded on *Elytropappus* species (Asteraceae) but it is impossible to identify any of the seven *Elytropappus* species as the host plant since all occur within the distribution range of *J. recenta*. The specimen collected by Bellamy in 1994 was feeding on *Gnidia* sp. (Thymelaeaceae) (Bellamy, pers. comm.).

***Julodis confusa* sp. n.**, Figs 20–23, 42, 50

#### Description

*Body length.* 25.5–32.0 mm; mean 28.6 mm ( $n = 11$ ).

*Colour of integument.* Dorsum with pronotum and elytron metallic-green, sometimes with weak-blue sheen, pronotal sides changing to blue and elytral margin changing to violet-blue or dark-blue and fading near apex; venter black with bluish-bronze sheen; head and legs black with metallic-blue sheen.

*Colour of pulverulence.* Yellow or pale-yellow but darker (often orange) on head and setal patches in marginal elytral row.

*Head.* Setae erect, majority longer than half width of eye; pulverulent setae present from between eyes posteriorly across vertex, more densely spaced bilaterally.

*Thorax.* *Pronotum:* setae erect, longer than half width of eye; five longitudinal bands of foveae merging into continuous or discontinuous grooves; grooves and isolated foveae with dense pulverulence. *Elytron:* setae erect, longer than half width of eye; larger foveae regularly spaced,

round, sometimes squarish, arranged in five rows and bearing densely pulverulent setal tufts (on average 10 tufts in row 2); smaller interstitial foveae bearing weakly pulverulent and non-pulverulent setae. *Setation of venter:* long, dense. *Hypomeron:* mid-area beyond lateral pronotal margin with pulverulent setal tuft. *Metasternum:* with a distinct isolated patch of pulverulent setae near lateral margin. *Metepisternum:* without pulverulence. *Legs:* some tibial setae always longer than mid-tibial diameter; metatibia with densely spaced punctures dorsally, these more widely spaced and slightly larger laterally and in proximal half to one third of tibial length; tarsal pads dark dorsally. *Metacoxa:* posterointernal angle aspinose; median section with large glabrous area not reaching posterior margin, the latter not produced into a lobe; with pulverulent setal tufts proximad and distad of glabrous area.

*Abdominal sterna.* With fine, regularly and densely spaced distinct punctures and clusters of punctures, more widely and more irregularly spaced in posterior two thirds to half of last sternum, as well as mediad/posteriad of lateral pulverulent setal patches; each sternum with well-defined lateral pulverulent setal patch, round to square and slightly oblique on sterna 1–4, diameter of patch on sterna 2–4 between one third and half of sternum length; apex of last sternum bilobed in male. *Male genitalia:* as in Figs 20–23.

*Type material examined.* Holotype ♂, SOUTH AFRICA: Cape, 40 km ENE Clanwilliam, 32.02S 19.13E, 250m, 6. 9./10.ix.1986, C.L. Bellamy & D.S. Verity (TMSA). Paratypes: 1♀ (TMSA), 1♂, 1♀ (DSVC), same data as holotype; 4♂, same data but 24.ix.1994, R.L. Westcott (RLWE); 1♂, 1♀ (TMSA), 1♂, 4♀ (DSVC), South Africa: Cape, 31 km E Clanwilliam, 32.06S 19.05E, 450m, 6, 9/10.ix.1986, D.S. Verity & C.L. Bellamy; 2♂, 1♀, East of Pakhuis Pass (32.08S 19.00E), C.P., ix.1947, Mus. Exp. (SAMC); 3♂, 1♀, South Africa: Cape, 39 km E Clanwilliam, 32.02S 19.13E, 21.ix.1985, C.L. Bellamy, A.V. Evans (TMSA); 1♂, South Africa: Cape, Farm Pakhuis, 32.06S 19.05E, 450m, 21.ix.1985, C.L. Bellamy, A.V. Evans (TMSA); 3♀, South Africa: Cape, 39 km NE Clanwilliam, 250m, 32.02S 19.13E, 15.ix.1983, C.L. Bellamy (TMSA); 1♀ (BMNH), 2♂ (TMSA), 4♂, 7♀ (COCS), 1♀ (AJCS), R.S.A., Cape: Pakhuis Pass, nr Dr. C.L. Leipoldt grave, SE 32 19 Aa (32.08S 19.00E), x.1991, C.R. Owen; 4♀ (COCS), 2♂, 3♀ (TMSA), 1♂ (TSCB), same data but ix.1989; 1♂, same data but ix.1991 (AJCS).

**Etymology.** The name of the species reflects that most specimens in collections were confused with other species owing to superficial resemblance.

**Distribution** (Fig. 42). The distribution of this species seems to be very localized as all specimens were collected in the Pakhuis Pass area.

**Remarks.** *Julodis confusa* shows little variation besides some minor differences in coloration of the integument and pulverulence. The dorsum of the holotype is metallic-green with the elytral margin intensely metallic-blue, the pulverulence is yellow with the frontal setae and the marginal elytral row of setal tufts reddish-orange. The paratypes represent all the populations with their variations. *Julodis confusa* can be distinguished from other species, except *J. fascicularis* and *J. turbulenta*, by the metasternum which has a distinct isolated patch of pulverulent setae near the lateral margin. This character is unique to *J. confusa*, *J. fascicularis* and *J. turbulenta*.

Sympatric populations of *J. amoena* Péringuey are superficially (dorsal sculpture, colour of integument and pulverulence) similar to *J. confusa* but differ by lacking frontal pulverulence, having enlarged tarsal pads which are light-brown dorsally, and lacking the isolated patches of pulverulent setae on the metasternum.

Alternatively, the colour of integument and pulverulence distinguish *J. confusa* from the sympatric populations of *J. fascicularis* and from the allopatric species *J. turbulenta*. Furthermore, *J. confusa* has on average fewer larger foveae in each elytral row than the other two species. While the male genitalia of *J. fascicularis* are different from those of *J. confusa* (cf. Figs 20–23 and 28–33), the male genitalia of *J. turbulenta* are similar to *J. confusa*, the only difference being that the genitalia of *J. confusa* are relatively larger and the parameres of the aedeagus partly striated medioventrally (cf. Figs 20–23 and 24–27).

The degree to which *J. confusa* and *J. turbulenta* differ morphologically from each other is only slightly more than the difference between northern and southern populations of *J. fascicularis*, but in the case of *J. fascicularis* there is a continuous distribution with a gradual cline in morphology, while the male genitalia remain constant. This suggests actively interbreeding populations, whereas *J. confusa* and *J. turbulenta* are allopatric and exhibit little intraspecific variation, while their male genitalia differ slightly but constantly. *Julodis confusa* and *J. turbulenta* are consequently recognized as different

species rather than subspecies.

All specimens collected by C.L. Bellamy and D.S. Verity in 1986 were associated with *Phyllica axillaris* Lam. var. *microphylla* (Eckl. & Zeyh.) Pillans (Rhamnaceae) (Bellamy *et al.* 1988). In that publication the specimens were incorrectly identified as *Julodis mira* Obenberger.

***Julodis turbulenta* nom. n., Figs 24–27, 42, 51**

*Julodis flavohirta* Ferreira & da Veiga-Ferreira, 1958: 46. (*nec* Saunders 1871).

**Description**

**Body length.** 20.8–27.6 mm; mean 24.9 mm ( $n = 22$ ).

**Colour of integument.** Dorsum with pronotum and elytron metallic-olive-green to bronze; head, venter and legs black with variably intense bronze or bronze-purplish sheen.

**Colour of pulverulence.** Uniformly creamy-white.

**Head.** Setae erect, most longer than half width of eye; pulverulent setae present from between eyes posteriorly across vertex, mostly more densely spaced laterally (pulverulence often abraded).

**Thorax. Pronotum:** setae erect, both shorter and much longer than half width of eye; five longitudinal bands of foveae merging into continuous or discontinuous grooves; grooves and isolated foveae with dense pulverulence. **Elytron:** setae erect, both shorter and much longer than half width of eye; larger foveae regularly spaced, round, arranged in five rows and bearing densely pulverulent setal tufts (on average 13 tufts in row 2); smaller interstitial foveae bearing weakly pulverulent and non-pulverulent setae. **Setation of venter:** long, moderately dense. **Hypomeron:** mid-area beyond lateral pronotal margin with pulverulent setal tuft. **Metasternum:** with a distinct isolated patch of pulverulent setae near lateral margin. **Metepisternum:** without pulverulence. **Legs:** some tibial setae always longer than mid-tibial diameter; metatibia with densely spaced punctures dorsally, more widely spaced and larger laterally and in proximal third of tibial length; tarsal pads dark dorsally. **Metacoxa:** posteroventral angle aspinose; median section with large glabrous area not reaching posterior margin, the latter not produced into a lobe; with pulverulent setal tufts proximad and distad of glabrous area.

**Abdominal sterna.** With very fine, irregularly spaced isolated punctures and clusters of punctures, but these are often well spaced near midline;

each sternum with more or less well-defined lateral pulverulent setal patch, round to oval and slightly oblique on sterna 1–4; sometimes with additional small, weakly pulverulent setal patches near the large ones; diameter of larger patch on sterna 2–4 approximately one third of sternum length; apex of last sternum slightly concave in male. *Male genitalia*: as in Figs 24–27.

*Type material examined*. Lectotype ♂ (designated here), SOUTH AFRICA: Capland, Stellenbosch (33.56S 18.51E), ix.1925, Dr. H. Brauns (TMSA). Paralectotype ♀ (designated here): same data as lectotype (TMSA).

*Additional material examined*. SOUTH AFRICA: Western Cape Province, 1♂, Stellenbosch (33.56S 18.51E) ix.1925, Dr. H. Brauns (BMSA); 3♂, same data but 25.ix.1925 (TMSA); 1♂, same data but ix.1924 (TMSA); 1♂ (MRAC), 7♂ (SMTD), 1♂ (DEIC), 2♂ (ISNB), 1♂ (BMNH), 2♂ (ZSMC), 1♂ (ZMHB), without locality data.

*Etymology*. The nomenclatural confusion surrounding the identity of this species suggested the name 'turbulenta.'

*Distribution* (Fig. 43). The species is known only from Stellenbosch. No material has been collected for many decades and it is uncertain whether the species still exists as the area has undergone extensive urban and agricultural development during the last century. Only 22 specimens could be found in collections.

*Remarks*. The morphology of *J. turbulenta* is consistent and only the dorsal colour varies from metallic-olive-green to bronze. The species is easily confused with sympatric southern populations of *J. fascicularis* (e.g. from Cape Town and Stellenbosch). Only the apex of the last abdominal sternum in males (slightly concave in *J. turbulenta* and triangularly incised in *J. fascicularis*) and the male genitalia (cf. Figs 25–28 and 29–34) can be used for identification, whereas no distinguishing characters have been found for females.

There is much confusion concerning *J. flavohirta* Saunders. Laporte & Gory (1835: 4, pl. i, Fig. 3) gave an interpretation of *J. hirsuta* (Herbst). Several errors occur in that publication: the authors cited 'hirsuta L.' overlooking that the name is only cited as 'hirsuta Herbs' by Gmelin (1790: 1939). Furthermore, neither the redescription nor the specimen on which the interpretation is based, nor the figure attached to the specimen (figure cut from a copy of Laporte & Gory 1835, and identical to the specimen) match *J. hirsuta* (Herbst). In fact, the

description corresponds with *J. chevrolatii* Laporte (1835: 159). The specimen represents an undescribed species. Saunders (1871: 4) recognized these errors and, referring to the figure and the specimen marked as 'type', gave the new name *J. flavohirta* (nom. n. for *hirsuta* Laporte & Gory 1835 Fig. 3 (nec Laporte & Gory 1835: 4, nec Herbst 1786: 173)). Laporte & Gory's specimen bears a label in Saunders' handwriting 'flavohirta Saunders' making it the unambiguous type of *flavohirta*.

Théry (1936) compared *J. fascicularis* and *J. flavohirta* and considered *J. flavohirta* a subspecies of *J. fascicularis*. Théry based his decision on differences which do not warrant subspecies status, and *J. flavohirta* will be synonymized with *J. fascicularis* (Gussmann 1994). In Théry's collection a specimen is marked 'flavohirta Théry (handwritten by Théry), Paratype' which is a later and impermissible addition by Théry.

Ferreira & da Veiga-Ferreira (1958) cite Théry (1936) and reinstate *J. flavohirta*. Their assessment is based on male genitalia of specimens they considered were *J. flavohirta*. Actually, they were dealing with the sibling species of the southern populations of *J. fascicularis*, now named *J. turbulenta*, while the type of *J. flavohirta* undoubtedly belongs to the northern populations of *J. fascicularis*.

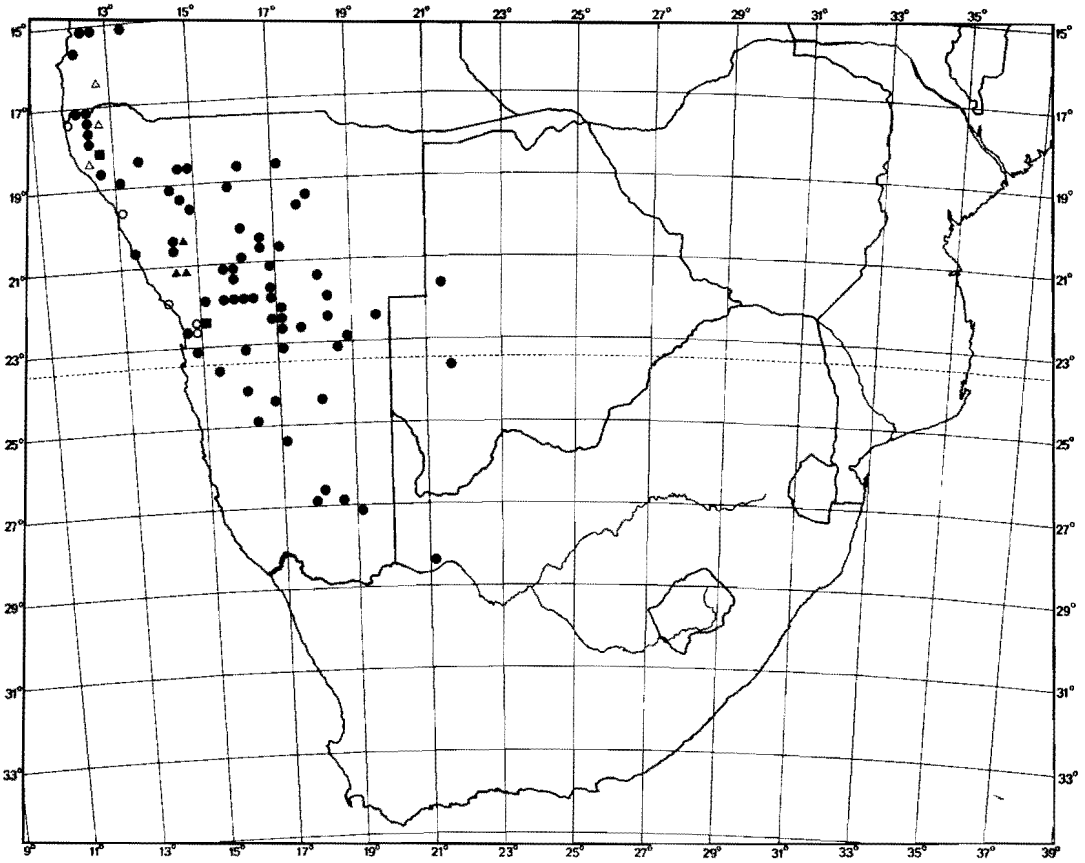
Under 'Material examined' Ferreira & da Veiga-Ferreira (1958) indicated that three males and one female, all labelled 'Capland, Stellenbosch, ix.1925, Dr. H. Brauns' are in TMSA. Only one male and one female (genitalia not dissected) bearing such labels are in TMSA, the other two males are missing, and must include those which Ferreira & da Veiga-Ferreira had dissected. Three males with the labels 'Capland, Stellenbosch, 25.ix.1925, Dr. H. Brauns' were found, but as none of them was dissected, these could also not be the specimens to which Ferreira & da Veiga-Ferreira referred. The remaining male and female labelled 'Capland, Stellenbosch, ix.1925, Dr. H. Brauns' are now designated as lectotype and paralectotype of *J. turbulenta* (nom. n. for *J. flavohirta* Ferreira & da Veiga-Ferreira 1958 (nec Saunders 1871)).

***Julodis egho kaokoensis* subsp. n.**, Figs 34–37, 43, 52

**Description**

*Body length*. 21.3–32.1 mm; mean 27.0 mm ( $n = 13$ ).

*Colour of integument*. Dorsum with head and



**Fig. 43.** Recorded distributions of *Julodis eggho eggho* ●, *J. eggho jordani* ○, both *J. eggho eggho* and *J. eggho jordani* ■, *J. eggho kaokoensis* △, both *J. eggho eggho* and *J. eggho kaokoensis* ▲.

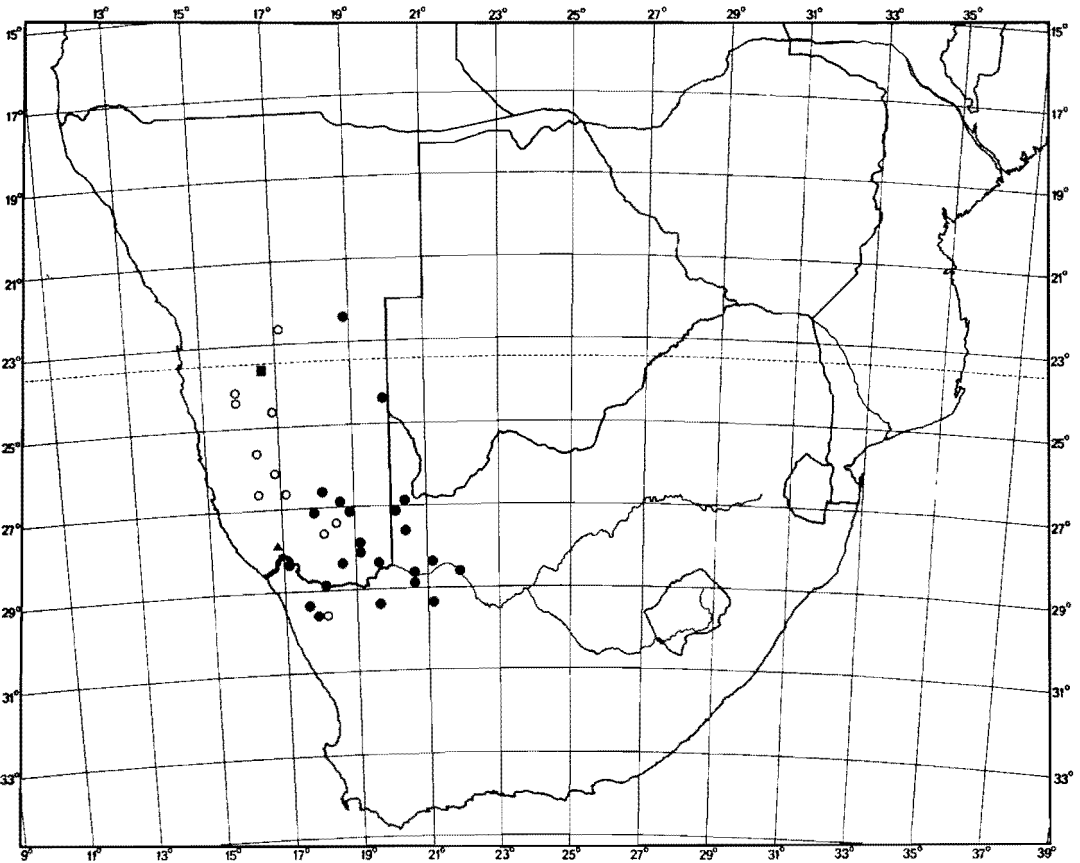
pronotum dark-metallic-blue or blue with very slight tinge of green, elytra always entirely castaneous; venter and legs similar in colour to head and pronotum but darker.

*Colour of pulverulence.* Yellow on head (only from between eyes posteriorly across vertex) and pronotum, white to yellowish-white elsewhere on head, on elytron and venter, but yellow on setal patches in marginal elytral row.

*Head.* Setae erect, majority slightly shorter than half width of eye; densely pulverulent setae present from between eyes posteriorly across vertex and less densely pulverulent setae elsewhere.

*Thorax.* *Pronotum:* with setae erect, both shorter and longer than half width of eye; foveae medially, anteromedially, and laterally in anterior half of pronotal length merging into continuous or discontinuous grooves; isolated foveae fairly regularly

but not densely spaced, irregular in size; grooves and foveae with dense pulverulence. *Elytron:* setae recumbent, shorter than half width of eye; rarely with sparse erect setae near base, more or less as long as half width of eye; larger foveae variable in size, round, regularly spaced, arranged in five rows, but with mediobasal and basosutural fovea always markedly larger and mediolateral fovea sometimes slightly larger; all larger foveae with dense pulverulence, the markedly smaller interstitial foveae with less dense pulverulence. *Ventral setation:* moderately long, variably dense, semi-recumbent. *Hypomeron:* mid-area beyond lateral pronotal margin with pulverulent setae not forming a tuft. *Metasternum:* without or with weak pulverulence. *Metepisternum:* most specimens with pulverulence on entire surface. *Legs:* tibial setae not longer than mid-tibial diameter; metatibia



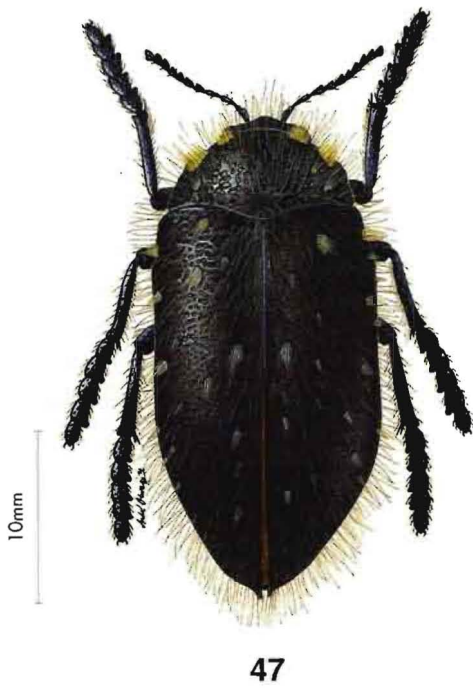
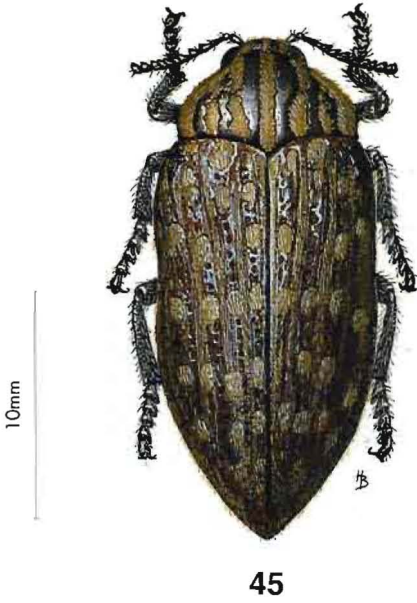
**Fig. 44.** Recorded distributions of *Julodis gariepina gariepina* ●, *J. gariepina damarina* ○, both *J. gariepina gariepina* and *J. gariepina damarina* ■, *J. gariepina reducta* ▲.

with closely spaced punctures dorsally, these slightly more widely spaced and larger on proximal third of tibial length; tarsal pads dark dorsally. *Metacoxa*: posterointernal angle aspinose; median section with glabrous area often limited to anterior two thirds of metacoxal width, with posterior margin not produced into a lobe; with pulverulent setae proximad, distad (and posteriad) of glabrous area.

*Abdominal sterna*. With isolated punctures and clusters of punctures; each sternum with pulverulence randomly spread over isolated punctures and clusters of punctures, but dense on a larger lateral setal patch and very often along midline; apex of last sternum truncate in male. *Male genitalia*: as in Figs 34–37.

*Type material examined*. Holotype ♂, NAMIBIA: Brandberg, SE 21 14 Ba (ca. 21.08S 14.38E),

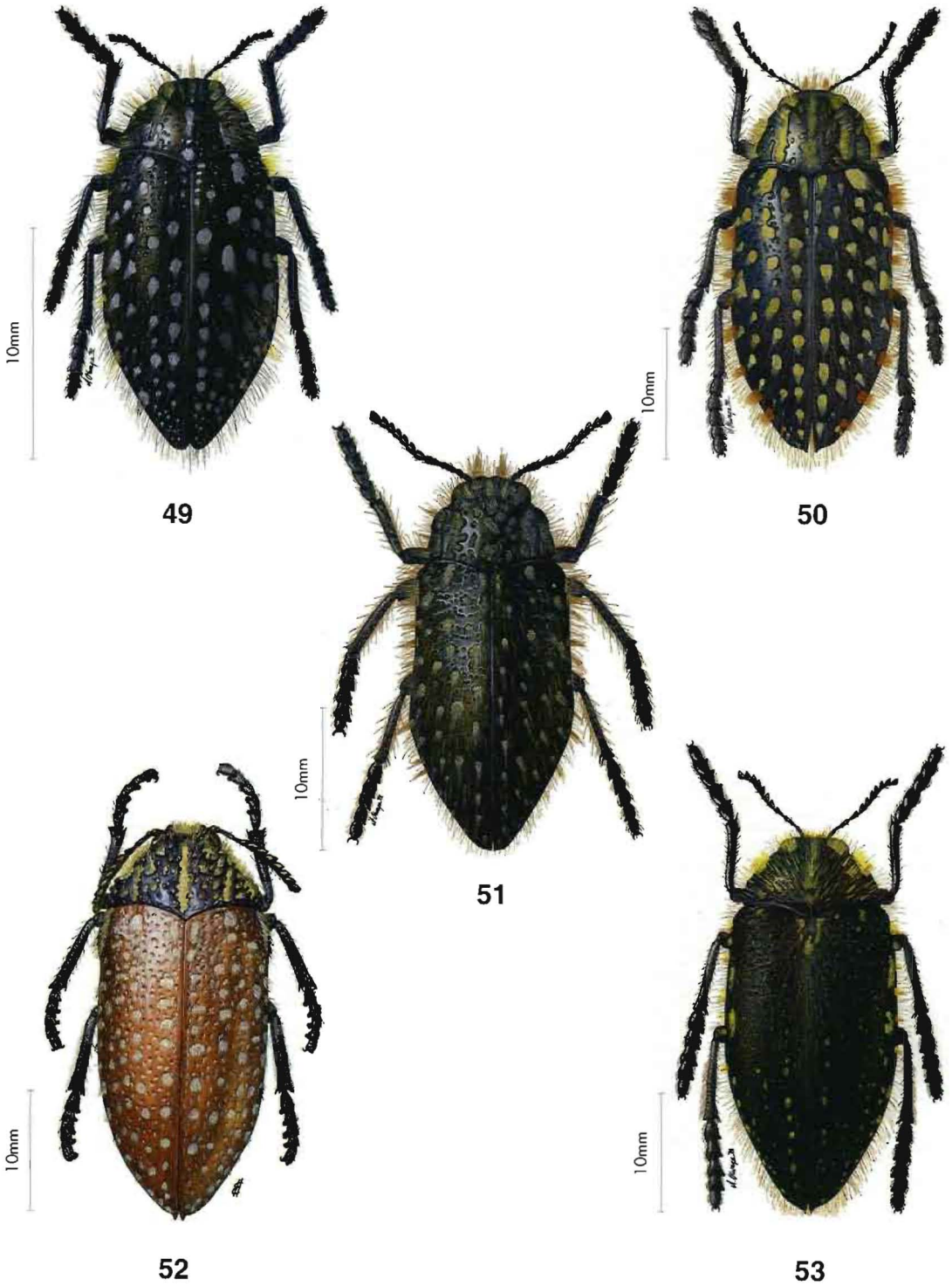
Swakopmund / H4349 (SMWN). Paratypes: 1♂, 2♀, ANGOLA. Huila District, J. Balfour-Browne, B.M. 1954-797 / Pediva, ca. 30 ml. E of Porto Alexandre (13.52S 12.09E), 400 ft., 25.–28.vi.1954, on Mopane bushes / Stn.No.304 (BMNH); 1♀, NAMIBIA. Otjihipa mountain, SE 17 12 Bc (17.20S 12.37E), 29.–30.iv.1991, E. Holm & S. Gussmann (SMWN); 2♀, Namibia, Petrified Forest, SE 20 14 Bc (20.25S 14.38E), 20.iv.1991, E. Holm & S. Gussmann (SMWN); 1♀, SWA, Brandberg, SE 21 14 Ab (ca. 21.08S 14.23E), 19.v.1973, R. Kluge (TMSA); 1♂, Damaraland, Brandberg, SE 21 14 Ab (ca. 21.08S 14.23E), x., E. Scherz (TMSA); 1♂, 1♀, South West Africa, Brandberg Mnts., Northern Valley, 21.05S 14.40E, 8.iv.1974, R. Oberprieler (SANC); 2♀, South West Africa, Brandberg, 21.10S 14.33E, ii.1978, S.J.v.Tonder (SANC); 2♀, NAMIBIA. Nadas Riv., 8.vi.1984, Dunefield E (ca. 18.15S 12.17E) (TMSA).



**Figs 45–48.** Dorsal aspects of *Julodis* species. **45,** *J. namibiensis*; **46,** *J. angolensis*; **47,** *J. oweni*; **48,** *J. dejagerae*.

Reproduced by Sabinet Gateway under licence granted by the Publisher (dated 2009).





**Figs 49–53.** Dorsal aspects of *Julodis* species and subspecies. 49, *J. recenta*; 50, *J. confusa*; 51, *J. turbulenta*; 52, *J. eggho kaokoensis*; 53, *J. gariepina reducta*.

**Etymology.** The subspecies is named after Kaoko-land in northwestern Namibia.

**Distribution** (Fig. 43). The subspecies is known from few localities. The distribution ranges from about 15° S in Angola to as far south as the Brandberg in Namibia. It occurs inland of *J. eggho jordani* Théry and appears restricted mainly to mountainous areas.

The northernmost locality records for *J. eggho eggho* could not be mapped in Fig. 43. The distribution of *J. eggho eggho* extends northward to 12° S in Angola along the Namib Desert.

**Remarks.** During a field trip to Namibia in 1991 the following observations were made: at the Petrified Forest two specimens of *J. eggho kaokoensis* were taken in flight, but *J. eggho eggho* was not found at that locality. Several long series of highly variable *J. eggho eggho* were collected along the Marienfluss riverbed. No further *J. eggho eggho* were found close to the Cunene River or in the Otjihipa Mountains. However, one dead specimen of *J. eggho kaokoensis* was collected in the Otjihipa Mountains and many specimens of this subspecies were seen feeding on mopane trees. They were also seen flying from an unidentified shrubby plant early in the morning. They were even observed on top of one of the summits (approximately 1800 m). All these observations suggest that *J. eggho eggho* and *J. eggho kaokoensis* are allopatric in this area although distribution maps suggest sympatric occurrence because of their inadequate resolution. Host plant selection may explain the ecological allopatry between the two subspecies. So far, only *Colophospermum mopane* (Kirk ex Benth.) Kirk ex J. Léonard (Fabaceae) is known as a host plant for adults of *J. eggho kaokoensis* (records from Pediva in Angola and from the Otjihipa Mountain in Namibia).

*Julodis eggho kaokoensis* can be distinguished by the following combination of characters: the head and pronotum dark-metallic-blue, sometimes with an additional slight tinge of green; the foveae on the pronotum more widely spaced than in *J. eggho jordani* (which has dense foveae); the pronotum with a median row of foveae merging into a continuous or discontinuous groove (not discernible in *J. eggho jordani*) and the elytron entirely castaneous.

*Julodis eggho kaokoensis* may be distinguished from specimens of *J. eggho eggho* with a uniformly castaneous elytron by their blue head and pronotum. *Julodis eggho eggho* specimens with castaneous elytra invariably have a distinct green sheen on the head and pronotum.

***Julodis gariepina reducta* subsp. n., Figs 38–41, 44, 53**

**Description**

**Body length.** 27.7–31.6 mm; mean 29.5 mm ( $n = 14$ ).

**Colour of integument.** Black.

**Colour of pulverulence.** Uniformly pale-yellow.

**Head.** Setae erect, both shorter and longer than half width of eye; pulverulent setae present from between eyes posteriorly across vertex.

**Thorax. Pronotum:** setae erect, both shorter and longer than half width of eye but always sparser and shorter in posterior third to quarter of pronotal length; five longitudinal bands of foveae merging into continuous or discontinuous grooves in at least anterior half of pronotal length and bearing densely pulverulent setae; isolated foveae with less dense pulverulence. **Elytron:** most setae recumbent, majority shorter than half width of eye; sparse erect setae aggregated near base and along suture, majority much longer than half width of eye; larger foveae limited to sutural, fourth and marginal rows and with distinctly larger single basomedian, mediolateral and often posthumeral fovea, all with setae and pulverulence dense (Fig. 53 depicts the relative sizes of these foveae); smaller interstitial foveae with weak pulverulence. **Ventral setation:** long, dense. **Hypomeron:** mid-area beyond lateral pronotal margin with a small patch of pulverulent setae not forming a distinct tuft. **Metasternum:** without pulverulence. **Metepisternum:** with band of pulverulent setae in ventral half of metepisternal length. **Legs:** some tibial setae always longer than mid-tibial diameter; metatibia with densely spaced small punctures dorsally, these more widely spaced in proximal half to one third of tibial length; tarsal pads dark dorsally. **Metacoxa:** posterointernal angle aspinose; median section with large glabrous area not reaching posterior margin, the latter not produced into a lobe; pulverulent setal tufts proximal and distad of glabrous area.

**Abdominal sterna.** With isolated punctures and clusters of punctures, irregular in size and spacing; each sternum with well-defined lateral pulverulent setal patch, diameter of this patch on sterna 2–4 between one third and half of sternum length; apex of last sternum weakly concave in male. **Male genitalia:** as in Figs 38–41.

**Type material examined.** Holotype ♂, NAMIBIA: Namuskluft 88, SE 27 16 Dd (ca. 27.51S 14.35E),

7.–15.X.1970 / H358 (SMWN). Paratypes: 8♂, 3♀ (SMNW), 1♂, 1♀ (TMSA), same data as holotype.

*Etymology.* The subspecies name refers to the reduced larger elytral foveae relative to the other two subspecies.

*Distribution* (Fig. 44). This subspecies is represented by a long series of specimens from an isolated population from Namuskluft in the rugged Huns Mountains.

*Remarks.* The specimens in this series show little variation, but differ from the other subspecies by having the larger elytral foveae much reduced. The larger foveae are limited to the marginal, sutural and fourth row and a distinctly larger single basomedian, mediolateral and often posthumeral fovea (Fig. 53).

This subspecies may have diverged from populations of *J. gariiepina damarina* Kerremans and has probably become isolated by mountainous

terrain with little opportunity for contact with *J. g. damarina*.

The male genitalia of *J. gariiepina reducta* are identical to both the other subspecies, but external morphology is consistently and sufficiently distinct to warrant subspecific status for this geographical isolate.

## ACKNOWLEDGEMENTS

I thank all institutions and collectors who kindly provided the specimens; my supervisor E. Holm (University of Pretoria) who initiated the study; A. Olwage, H. Bräuer and E. Holm for the excellent colour illustrations; C.L. Bellamy for his advice, support and encouragement; and the Foundation for Research Development, Pretoria, and the University of Pretoria for funding the project.

## REFERENCES

- BELLAMY, C.L., WESTCOTT, R.L. & VERITY, D.S. 1988. New synonymy, distributional and adult and larval host records for some southern African Buprestidae (Coleoptera). *The Coleopterists Bulletin* 42: 73–83.
- FERREIRA, M.C. & DA VEIGA-FERREIRA, G. 1958. Contribuição para o estudo dos Buprestídeos da sub-região natural da África do Sul. I. *Revista de Entomologia de Moçambique* 1: 1–136.
- GMELIN, J.F. 1790. In: Linnaeus, C. *Systema Naturae*. 13th Edition. 1: 1517–2224. Holmiae.
- GUSSMANN, S.M.V. 1994. Revision of the genus *Julodis* Eschscholtz (Coleoptera: Buprestidae) of southern Africa. Ph.D. thesis, University of Pretoria.
- HERBST, J.F.W. 1786. Erste Mantisze zum Verzeichniss der ersten Klasse meiner Insecten-Sammlung. In: Füessly, J.C. *Archiv der Insectengeschichte* 7-8: 153–182.
- HOLM, E. 1979. Revision of the genera of the tribe Julodini (Coleoptera: Buprestidae). *Journal of the Entomological Society of Southern Africa* 42: 89–114.
- KERREMANS, C. 1905. *Julodis*. In: *Monographie des Buprestides* 1 (in livraisons 6–11): 192–322. Bruxelles.
- LAPORTE, FL. 1835. Etudes entomologiques, ou descriptions d'insectes nouveaux et observations sur la synonymie, par M.EL. de Laporte, comte de Castelnau. *Revue Entomologique* 3: 157–181. G. Silbermann, Paris.
- LAPORTE, EL. & GORY, H.L. 1835. Genre *Julodis*. *Histoire Naturelle et Iconographie des Insectes Coléoptères* I. Paris.
- LINDROTH, C.H. & PALMÉN, E. 1970. Coleoptera. In: Tuxen, S.L. (Ed.) *Taxonomist's Glossary of Genitalia in Insects*. 2nd Edition. 80–88. Ejnar Munksgaard, Copenhagen.
- LINNAEUS, C. 1758. *Systema Naturae Per Regna Tria Naturae, Secundum Classes, Ordines, Genera, Species, Cum Characteribus, Differentiis, Synonymis, Locis*. 10th Edition. Vol. 1: 1–824. Holmiae.
- McCLAIN, E. & GERNEKE, D. 1990. Morphology of wax blooms on selected Namib Desert beetles (Coleoptera: Tenebrionidae). In: Seely, M.K. (Ed.) *Namib Ecology: 25 Years of Namib Research*. 193–202. Transvaal Museum Monograph No. 7.
- SAUNDERS, E. 1871. *Catalogus Buprestidarum Synonymicus et Systematicus*. Janson, London.
- THÉRY, A. 1936. Essai d'une classification des *Julodis* de l'Afrique Australe. *Bulletin et Annales de la Société Entomologique de Belgique* 76: 327–370.

Accepted 1 June 1995