The First Australian *Paratrachys* (Coleoptera: Buprestidae), with Comments on the Higher Classification of the Genus

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Abstract

Two new species of *Paratrachys*, the first known from Australia, are described. *P. australia*, sp. nov., from coastal New South Wales is placed in the nominate subgenus and *P. queenslandia*, sp. nov., from Queensland, in *P. (Friendiella)* Hořňáský. The species are fully described, illustrated and a brief discussion is presented on the recent generic review by Hořňáský and the placement of this genus in the familial hierarchy. A modified key for both *Paratrachys (Friendiella)* and *P. (s. str.)* the *Hederae-circle* is presented to incorporate these new species. A cladistic analysis shows that the Paratrachydina is best defined as monotypic.

Introduction

The genus *Paratrachys* Saunders is a group of very small buprestids known from India through eastern Asia, Indonesia, Papua New Guinea, the Philippine Archipelago, north to Japan and now south to north-eastern Australia. Hořňáský (1992a) has recently reviewed the genus, erecting three morphologically and geographically substantiated subgenera, *Paratrachys, Friendiella* and *Mobsbyella*. In that work, Hořňáský discussed the rather sinuous systematic history of the genus and later (Hořňáský 1993) placed it, together with *Sponsor* Laporte & Gory, in the *Paratrachydina* Cobos of the tribe *Thrincopygini* LeConte. Cobos (1980) had originally defined the subtribe solely for *Paratrachys*, while placing *Sponsor* and *Ptosima* Solier together in the nominate subtribe *Ptosimina* Kerremans. In the last key to higher buprestid taxa in Australia (Bellamy 1986), *Paratrachys* would be placed within the *Prospherini* (currently *Prosphorina*), a very different looking group of taxa that are currently classified in another tribe, *Tyndarini* Cobos, by Hořňáský (1993).

Hořňáský (1992a) also noted that all known biological records for species of *Paratrachys* indicate an apparent coevolution with various species of figs (*Ficus* spp., Moraceae). The leaf-mining habit of *Paratrachys* is quite different from the wood-boring larval biology of all immediate relatives (i.e. it is the only group of leaf-miners within the entire subfamily Buprestinae) and this has led some authors (e.g. Kerremans 1903, Toyama 1987) to rather place the *Paratrachys* within the ‘Trachites’ of Kerremans. Even disregarding *Paratrachys* and its biology, leaf-mining within the buprestids has apparently evolved several times as evidenced by the diversity of host associations, larval morphology and pupation strategies that indicate that those genera currently placed within tribes of Aphastinticini Jacquelin du Val and Trachydini Laporte by Hořňáský (1993) cannot be demonstrated as monophyletic (the late G. B. Vogt, personal communication; Hespenheide 1991).
Material, Methods and Constraints

Specimens were borrowed from, or are deposited in, the following collections, with the following abbreviations used in the text.

ANIC Australian National Insect Collection, Canberra, ACT, Australia
AM Australian Museum, Sydney, NSW, Australia
GW G. Williams collection, Taree, NSW, Australia
QM Queensland Museum, Brisbane, Qld, Australia
SAM South Australian Museum, Adelaide, SA, Australia
SW S. Watkins collection, Caparra, NSW, Australia
TM Transvaal Museum, Pretoria, South Africa

The single specimen of *P. queenslandia*, sp. nov., was not dissected when prepared and we did not think the potential for damage was worth the risk; none of Holyński’s recently described species featured either genitalic description or illustration. Genitalic dissections were made by the two collectors of the type series of *P. australia*, sp. nov.

The cladistic analysis was accomplished with Hennig86, version 1.5 (Farris 1988), on a 486SX IBM compatible PC, applying several different calculation options and the *a posteriori* successive-weighting procedure. The Hennig86 weighting procedure operates by calculating weights from the best fits of the character states on the most parsimonious cladograms using rescaled consistencies, that is, the products of the consistency indices (CI) and retention indices (RI) of the character states. For the most rigorous application, the ‘implicit enumeration’ (*ie*) routine was alternated with the *a posteriori* weighting function (*xs w*). These routines are alternated and repeated on successively produced cladograms until they no longer change.

Discussion

Genus *Pamtrachys* Saunders


Remarks

The recent review of the genus by Holyński (1992a) stands as the major reference to our effort; in that work, three subgenera of *Paratrachys* were defined and can be distinguished as follows.

Key to the subgenera of *Paratrachys*

[modified from Holyński 1992a]

1. Supramarginal furrow of elytra merges at the anterior end into the marginal furrow. ......................... 2
   Supramarginal and marginal furrows of elytra separated over their entire lengths. ......................... *Paratrachys* (s. str.) Saunders

2. Dorsal pubescence well developed. .......................... *Mobshyella* Holyński
   Dorsal pubescence apparently lacking. .......................... *Friendiella* Holyński

Subgenus *Friendiella* Holyński

*Paratrachys* (*Friendiella*) *queenslandia*, sp. nov.

(Figs 1, 2)

Specimens Examined

Holotype. Sex undetermined (QM): Australia Qld, Davies Creek Dr., 25 km ESE Mareeba, 24.xii.1986, H. and A. Howden.
Description of Holotype

Diagnosis

Small, 1.9 X 1.1 mm; elongate ovoid; flattened above and below, tranversely subconvex dorsally; nitid black above and below except for antennae, maxillary palpi, a portion of the femoral faces and the entire of the tibiae and tarsi brumeneous; anteclypeus and eyes testaceous. Dorsal surface sparsely covered with moderate-sized punctures; no vestiture visible at 45X.

Head with frontovertex entire with margin of eye viewed from above broadly convex; eyes large, widely separated, inner margins parallel; frons rectangular between eyes, slightly wider than long; antennal insertions widely separated, small; frontoclypeus short, distal emargination broadly, shallowly arcuate; anteclypeus partially visible; labrum short, sparsely setose distally; genae grooved for reception of basal antennomeres in repose; antennae short, not reaching midpoint of pronotum when laid alongside; antennomeres 1 and 2 slightly swollen, 3-5 narrow, 6-10 serrate, 11 oblong, rounded distally.

Pronotum trapezoidal, 2.7X wide as long, widest at base; anterior margin arcuate; posterior margin nearly straight, broadly, feebly arcuate along entire width; narrow premarginal band, impunctate but finely longitudinally grooved and dentate distally; posterolateral angles acute; lateral margins narrowing from base to anterior margin at about 60° angle; marginal carina entire. Scutellum triangular; longer than wide; anterior margin convex.

Elytra about 3.7X longer than pronotal length; 1.2X longer than wide, widest opposite humeri; lateral margins narrow arcuately from past humeri to small, separately rounded apices; marginal furrow visible from opposite midpoint of metacoxa to opposite suture between ventrites 2 and 3; epipleuron broadly lobed, rounded distally, covering entire mesepimeron and most of mesepisternum, separated from disk by fine, nearly straight carina.

Prosternum and metasternum feebly gibbose medially, punctures slightly larger than those dorsal, each with fine lateral ridge, arranged in somewhat concentric semicircular rows around swollen midpoints; prosternal process with length and width subequal, posterior margin evenly transverse; posterior margin of metacoxa broadly, shallowly, concave; length of ventrites 1 + 2 longer than 3 + 4 + 5; suture between 1 and 2 only indicated laterally; sutures between 2 and 3, and 3 and 4 only very slightly arcuate, between 4 and 5 more arcuate, more so laterally; 5 with sides attenuate to broadly rounded apex; punctuation on ventrites slightly more regular, more dense than dorsal surface, ventrites 2–5 each with single row of short, stout, adpressed, testaceous setae arranged in broad arc before each respective suture.

Legs with femora stout, margins subparallel; tibiae arcuate basally, otherwise straight; tarsi short, tarsomeres 1–4 each with elongate, broad ventral pulvillus; 5 short, claws with basal appendices.

Figs 1–2. Paratrachys (Friendiella) queenslandia, sp. nov. 1. Dorsal aspect; 2, lateral aspect of left elytron, showing marginal furrow.
Remarks

This specific epithet is a derivation of Queensland. Paratrachys (Friendiella) queenslandia keys to P. (F.) marylae Holyński in the recent key (Holyński 1992a), but P. marylae differs (from the description) by being slightly shorter and more robust, having at least some frontal pubescence, indistinct pronaot fovea, the elytra being 3.7 times the pronotal length and 1.3 times longer than wide. The marginal furrow extends much further apically and the supramarginal furrow is, at least, indicated at the base. In addition, P. marylae comes from north-west Papua New Guinea, so the distance between these localities, the perceived limited vagility of such small beetles and the very long time since Australia and New Guinea were contiguous indicate both a geographic and temporal distinction between these two taxa as well. The recent key of Holyński (1992a) is modified to allow identification of P. queenslandia as follows.

Key to the Species of Paratrachys (Friendiella) Holyński

[modified from Holyński 1992a]

1. Supramarginal furrow of elytra missing or rudimentary ........................................ 2
   Supramarginal furrow well developed, reaching at least to midlength of elytra .......... 6
2. Marginal furrow missing (Irian Jaya, Salwatty I.) .................. P. cuneiformis (Deyrolle)
   Marginal furrow well developed ........................................ 3
3. Body length exceeding 3 mm; marginal furrow disappears at apical third of elytra (Sulawesi, Macassar)
   Body length not exceeding 3 mm; marginal furrow extends to at least apical fifth .......... 4
4. Frontal pubescence long, distinct; elytra less than 3.4 × longer than pronotum ('Larat'?)
   Frontal pubescence very short, inconspicuous or absent; elytra more than 3.5 × longer than pronotum . . . 5
5. Frontal pubescence very short; pronotum with three inconspicuous basal fovea; marginal furrow extends to near opposite suture between ventrites 4 and 5 (NW PNG, W Sepik Prov.) ....... P. marylae Holyński
   Frontal pubescence absent; pronotum without fovea; marginal furrow extends to opposite suture . . .
   between sterna 3 and 4 (Australia, Queensland) .................. P. queenslandia, sp. nov.
6. Front only slightly wider than long (PNG, Huon Gulf, Sattelberg) .................. P. biroi Holyński
   Front nearly twice as wide as long (SE PNG, Fergusson I.) .................. P. fergussonica (Kerremans)

Subgenus Paratrachys (s. str.)

Remarks

In discussing the nominate subgenus, Holyński (1992a) recognised ‘three fairly well defined circles’, a term defined in another work (Holyński 1992b). In that later work, Holyński noted that he had found no appropriate technical term was available with which to discuss a category that falls between the species and the subgenus since he found superspecific subdivisions of subgenus are referred to either ‘incorrectly’ as superspecies or ‘imprecisely’ as species-groups. Thus, he introduced the term ‘circle’ and defined it as a group of closely related species, having all the properties of an infrasubgeneric taxon, but which remains nomenclaturally informal. A circle must also have the following four characteristics: monophyly, equivalence (i.e. circles should be approximately equal), exhaustiveness and exclusivity (i.e. species belong to only one circle). The arguments against the acceptance of this term include the need to compare it to the definition of ‘superspecies’ given in the most recent (1985) version of the ICZN. However, it is only our intention to discuss the new Australian species in light of Holyński’s previous work, and to do such we need to make the term ‘circle’ accessible.

The three circles of Paratrachys (s. str.) can be distinguished in the following short key; the new species described below, P. (P.) australia, belongs to the Hederae-circle, the largest and most widely distributed of the three.
Key to the Circles of *Paratrachys* (s. str.)
[modified from Holyfnski 1992a]

1. Dorsal pubescence undifferentiated, or with dark ovate periscutellar patch only .......... *Pilifrons-circle*
   Dorsal surface with distinct pattern of white pubescence on dark background........................... 2

2. Pubescent pattern includes a very regular elliptic band, common to both the pronotum and elytra ........
   Pubescent pattern on elytra consisting of more or less interconnected zigzag bands, or not extending to
   pronotum ............................................................ *Bakeri-circle*
   ................................................................................... *Hederae-circle*

*Paratrachys* (s. str.) *australia*, sp. nov.
(Figs 3–5)

Specimens Examined

**Holotype.** ♂ (AM): AUSTRALIA, NSW, 0-2 km NE Harrington, 17.xii.1987, G. Williams, in littoral rainforest.

**Allotype.** ♀ (AM), same data as holotype. 17 paratypes: 3 ♀ (2 GW, 1 TM), same data except 25.xii.1987; 1 ♀ (SAM), 'littoral rainforest' 1.5 km north of Harrington, NSW, 6.iii.1993, S. Watkins; 1 ♂, 2 ♀ (ANIC, SW, TM), same data except 9 March 1993; 1 ♀ (SW), same data except 11.iii.1993; 1 ♂ (SAM), same data except 24.iii.1993; 1 ♀ (SW), same data except 3.xii.1993; 2 ♂ (SW), same data except 12.xii.1993; 1 ♂, 1 ♀ (ANIC, SW), same data except 16.xii.1993; 1 ♂, 2 ♀ (SW, TM), same data except 23.xii.1993.

**Description of Holotype**

**Diagnosis**

Small, 2.6 × 1.7 mm; subovoid; flattened above and below, tranversely subconvex dorsally; nitid black above and below except for antennae, maxillary palpi and tarsi brunneous; the anteclypeus and eyes are testaceous. Dorsal surface moderately covered with medium-sized punctures; elytral with very feebly elevated closed spaced sinuate costae. Head vestiture of long, recumbant white setae, longer on vertex than on frons, projecting away from midline; pronotum with setae slightly shorter than head and variously orientated; elytra with short, stout, semierect setae, black or white in tessellate pattern, except in apical 1/3 where white setae are entire (white setal distribution indicated by stippled areas of Fig. 3). Ventral surface with short, recumbent white setae, slightly more dense on abdominal sterna; setae on thoracic sterna directed obliquely inward and posteriad, those on abdominal sterna directed posteriad.

Head with frontovertex entire with margin of eye viewed from above broadly, yet shallowly convex; eyes large, widely separated, inner margins subparallel; frons rectangular between eyes, slightly wider than long; antennal insertions widely separated, small; frontoclypeus short, distal emargination broadly, shallowly arcuate with slight marginal carina evident; anteclypeus partially visible; labrum short, sparsely setose distally; genae grooved for reception of basal antennomeres in repose; antennae short, not reaching midpoint of pronotum when laid alongside; antennomeres 1 and 2 slightly swollen, 3–5 narrow, 6–10 triangularly serrate, 11 oblong, rounded distally.

Pronotum trapezoidal, 2.3 × wide as long, widest at base; anterior margin arcuate; posterior margin feebly bisinuate; narrow pre marginal band, impunctate but finely longitudinally grooved and dentate distally; posterolateral angles acute; lateral margins narrowing from base to anterior margin at about 65° angle; marginal carina entire. Scutellum triangular; longer than wide; anterior margin convex.

Elytra 3.0 × longer than pronotal length; length and width together approximately equal, widest opposite humeri; lateral margins narrow arcuately from past humeri to small, separately rounded apices; marginal furrow visible from before anterior midpoint of humeral swelling to about opposite suture between sterna 2 and 3; epipleuron broadly lobed, rounded distally, covering entire mesepimeron and most of mesepisternum, separated from disk by fine, nearly straight marginal carina. Pygidium visible beyond elytral apices.
Figs 3–5. Paratrachys (s. str.) *australia*, sp. nov. 3, Dorsal aspect, stippled areas indicate distribution of white setae on elytra; 4, lateral aspect of left elytron, showing marginal furrow; 5, metathoracic wing, a indicates the darkened distal portion of the radial vein, b indicates the widely separated and arcuate condition of the medial and cubitus vein junction.

Prosternum and metasternum feebly gibbose medially; prosternal process with length slightly greater than width, posterior margin evenly transverse; posterior margin of metacoxa evenly transverse; length of sterna 1 + 2 longer than 3 + 4 + 5; suture between 1 and 2 only indicated laterally; sutures between 2 and 3 and 3 and 4 only very slightly arcuate, between 4 and 5 more arcuate, more so laterally; 5 with sides attenuate to broadly rounded apex.

Legs with femora stout, margins subparallel; tibiae arcuate basally, otherwise straight; tarsi short, tarsomeres 1–4 each with elongate, broad ventral pulvillus; 5 short, claws with large rounded, basal appendices.

The genitalia are mounted on card beneath specimen, being not completely dissected from surrounding tissues and therefore not illustrated.

The wing is as shown in Fig. 5. We have also examined the wing of *P. (Mobsbyella) fisheri* Obenberger from the Philippines and find that it agrees in all detail with *P. australia*. One problem of placing too much importance on wing-venation character states arises with the reductions apparent in very small species and the conclusions these suggest. Good (1925) illustrated the wing venation for the buprestid genera then known from North America. In that work, illustrations of *Ptosima gibbicollis* (Say) and two trachyne leaf-miners, *Brachys tessellatus* (F.) and *Taphrocerus gracilis* (Say) show features similar to those noted in *Paratrachys*. Again, however, considering the reductions observed in *Paratrachys*, *Brachys* and
*Taphrocerus* due to their small size, any discussion of relationship prompted by observations of similar venation patterns must be accepted with caution, as the loss of certain veins may be both proportional to size reduction and nothing more than analogous in otherwise highly divergent lineages. The wing of *Sponsor* (s. str.) *raffrayi* Théry from Kenya has also been dissected for comparison to these taxa. From the examination of the wings of *Paratrachys*, *Sponsor* and *Ptosima*, a transformation of character states is apparent. *Ptosima gibbicollis*, the largest of these taxa, shows the most detail and retention of the greatest number of anal veins, and retains a clearly differentiated radial cell. In both *Sponsor* and *Paratrachys*, increasing reduction in venation is apparent as the body size decreases. Fewer anal veins are present in *Paratrachys* than in *Sponsor*, both genera share the character state of an apparent loss of the, or at least an undifferentiated, radial cell which is indistinguishable in both taxa from within the expanded and darkened sclerotised distal portion of the radial vein (Fig. 5, a). One character state that appears synapomorphic for *Paratrachys*, *Sponsor* and *Ptosima*, in contrast to the trachyines discussed above, is the broadly arcuate junction of the medial and cubitus veins (Fig. 5, b). In the trachyine genera (*Brachys*, *Taphrocerus*), this junction is rather narrow and angulate.

**Female**

Slightly more robust than the male. Length, 2.8–3.0 mm; width, 1.8–1.9 mm.

**Remarks**

This new species is named for the country of origin, significant as the genus has not previously been reported from the continent. Stan Watkins, collector of the majority of the specimens listed above, reported that the specimens he collected were not associated with *Ficus*. He said that no *Ficus* occurred at the site where he collected and that he was unable to associate them with any particular plant(s) as the beetles were high up on leaves of various species; he collected them by sweeping blind. However, according to Williams (1993, appendix 3) the littoral rainforest in the vicinity of the type locality has five species of *Ficus* present: *F. coronata*, *F. fraseri*, *F. obliqua*, *F. rubiginosa* and *F. superba* var. *heneana*. Most probably, one or more of these species serves as the larval host for *P. australis*.

This new species keys to *P. hypocrita* (Fairmaire) in the recent key by Hołyński (1992a), a species represented by four subspecies that occur in various localities of tropical southern China and south-east Asia. *Paratrachys australis* can be separated from *P. hypocrita* as indicated in the modified key below. The species of the *Hederae-circle* are the most numerous grouping in the genus. These species may be separated provisionally in the following key, modified from Hołyński (1992a) to incorporate this new species.

**Key to the Species and Subspecies of the *Hederae-circle* of *Paratrachys* (s. str.)**

[modified from Hołyński 1992a]

1. Elytral ornamentation consisting of two semicircular bands ........................................ 2
2. Scutellum distinctly longer than wide; front longitudinally depressed (China: Yunnan) .............. 3
   Scutellum as wide as long; front regularly convex (China: Yunnan) .................................. *P. chinensis* Obenberger
3. Elytral punctures arranged into regular, or almost regular, rows ........................................ 4
   Elytral punctures irregular over most of surface and not in more or less regular rows .......... 10
4. Dorsal pubescence with admixture of rufous setae .......................................................... *P. nigricans* (Kerremans) 5
   Dorsal pubescence black and white, without rufous setae .............................................. 6
5. Rufous pubescence of dorsal surface very distinct, forming conspicuous spots on elytral disk (N India) ........................................ *P. nigricans* bengalensis Théry
   Rufous pubescence inconspicuous, appreciable mainly on head, along anterior margin of pronotum, and at elytral apex; no contrasting spots on elytral disk (S India) .............. *P. nigricans* (s. str.)  7
6. Body slightly larger on average, elytra with two zigzag setal fasciae (Chine, SE Asia) ................ *P. hypocrita* (Fairmaire) 8
   Body smaller, elytra with one medial zigzag fascia (Australia) ..................................... *P. australis*, sp. nov.  9

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Slightly more robust than the male. Length, 2.8–3.0 mm; width, 1.8–1.9 mm.

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7. Length of body less than 3.2 mm; elytra almost regularly rounded apically .................. 8
   Length of body more than 3.4 mm; elytra less regularly rounded, almost truncated apically (China) .................. P. hypocrita cobosi Holyński
8. Antennae and tarsi partly yellowish (N Thailand) .................. P. hypocrita miyatakei Kurosawa
   Antennae and tarsi dark brownish .................................................. 9
9. Sides of elytra form a common curve with sides of pronotum; humeral prominences not prominent (So. China, N Indochnina) .................. P. hypocrita (s. str.)
   Sides of elytra and pronotum not forming a common curve; humeral protuberences prominent (Laos, Vietnam) .................. P. hypocrita vietnamensis Cobos
10. Elytral pubescent pattern 'unidentate': neither anterior nor posterior band extends laterally beyond connecting longitudinal stripe; length of body above 3.8 mm (SE India) .................. P. nadja Cobos
    Elytral pattern 'bi- or tridentate': posterior and sometimes also anterior transverse bands laterally extending distinctly beyond connecting longitudinal stripe; length of body below 3.7 mm .................. 11
11. Supramarginal furrow very fine, inconspicuous (China: Yunnan) .................. P. hederoides Cobos
    Supramarginal furrow as distinct as marginal furrow .................................. 12
12. Elytra very short (1.1 times as long as wide), decidedly truncated apically (S Japan) .................. P. hederae Saunders
    Elytra 1.2 times longer than wide, almost regularly rounded posteriorly .................. P. princeps Kurosawa 13
13. Dorsal surface black, nonmetallic (Riu-Kiu Archipelago: Amami Group) .................. P. princeps (s. str.)
    Dorsal surface with more or less aeneous tint (Riu-Kiu Archipelago: Okinawa) .................. P. princeps chujoi Kurosawa

Phylogeny of Paratrachys

Since Cobos (1980) placed Paratrachys in a monotypic subtribe (Ptosimini: Paratrachysae) and Holyński (1993) removed Sponsor from Ptosimina and included it with Paratrachys in Paratrachydina, it appears that a more empirical approach is needed to define the proper subtribal placements for this genus. Taxa from four subtribes placed in the tribe Thrincopygini LeConte (sensu Holyński 1993) were examined (see Table 1); those not included exist outside of the Australasian and Oriental realms. Xyroscelis crocata (Gory & Laporte) (Xyroscelidina

Table 1. Taxa examined to construct a character state matrix

| Classification follows Holyński (1993) with adjustments from present cladistic analysis |

| Buprestinae Leach |
| Anthaxiini Gory & Laporte |
| Trachykelina Holyński |
| Trachykele blondeli Marseul |
| Acmaeoderini Kerremans |
| Acmaeoderina Kerremans |
| Acmaeodera barri Cazier |
| Thrincopygini LeConte |
| Nothomorphina Cobos |
| Nothomorpha verrucosa (Gory & Laporte) |
| Xyroscelidina Cobos |
| Xyroscelis crocata (Gory & Laporte) |
| Paratrachydina Cobos |
| Paratrachys australia, sp. nov. |
| Paratrachys queenslandia, sp. nov. |
| Ptosimina Kerremans [= Acmaeoderoidina Cobos] |
| Ptosima gibbicollis (Say) |
| Sponsor raffrayi Théry |
| Acmaeoderoides distincta Nelson |
Table 2. Characters and character states examined

<table>
<thead>
<tr>
<th>Character</th>
<th>1. Frontovertex: evenly convex or slightly depressed (p), swollen between eyes (a).</th>
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<td>2. Eyes: small, not ‘touching’ pronotal margin (p), large, ‘touching’ pronotal margin (a).</td>
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<td>3. Eyes, inner margins: converging dorsally or subparallel (p), diverging dorsally (a).</td>
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<td>4. Mandibles: robust, coarsely punctate laterally (p), slender, sparsely or impunctate laterally (a).</td>
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<td>5. Anteclypeus: visible (p), not visible (a).</td>
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<td>6. Antenna: serrate from antennomere 3 or 4 (p), 4 expanded distally (a), serrate from 5 (a1), serrate from 6 (a2).</td>
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<td>7. Last antennomere: truncate (p), oblong, rounded (a).</td>
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<td>8. Pronotum: irregular, with several large depressions (p), disk entire, flat to convex (a), with single median depression (a1).</td>
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<td>9. Pronotum, widest portion: median (p), base (a).</td>
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<td>10. Pronotal basal foveae: present, deep (p), present, shallow or feebly indicated (a), absent (a1).</td>
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<td>11. Pronotal basal foveae: one medial, two lateral (p), only two lateral</td>
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<td>12. Pronotum, widest portion: median (p), base (a).</td>
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<td>13. Epipleural lobe: absent (p), present (a), secondarily lost with suite of elytral adaptations (a).</td>
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<td>15. Epipleural lobe covering metepisternum: completely (p), partially (a).</td>
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<td>16. Scutellum: absent, or not visible beneath fused elytra (p), present, visible (a).</td>
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<td>17. Elytra: not fused (p), fused (a).</td>
</tr>
<tr>
<td></td>
<td>18. Elytral surface: punctate (p), costate with interstitial punctures (a), carinate (a1).</td>
</tr>
<tr>
<td></td>
<td>19. Elytral surface: more or less even (p), with pronounced sinuous carina (a).</td>
</tr>
<tr>
<td></td>
<td>20. Elytral punctures: without setae (p), with single seta projecting (a).</td>
</tr>
<tr>
<td></td>
<td>21. Elytral sutural margin, at least apically: entire (p), sub serrate or serrate (a).</td>
</tr>
<tr>
<td></td>
<td>22. Elytral lateral margin, at least apically: entire (p), sub serrate or serrate (a).</td>
</tr>
<tr>
<td></td>
<td>23. Prosternum, anterior margin: more or less entire (p), projecting anteriorly (a).</td>
</tr>
<tr>
<td></td>
<td>24. Prosternal disc: medially gibbose (p), entire, even (a).</td>
</tr>
<tr>
<td></td>
<td>25. Hypomera: entire (p), with scrobes to receive fore- and mid-legs (a).</td>
</tr>
<tr>
<td></td>
<td>26. Abdomen, suture between sternites 2 and 3: even, entire (p), with posteriorly convex median lobe (a).</td>
</tr>
<tr>
<td></td>
<td>27. Femora: fusiform (p), sides more or less subparallel (a).</td>
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<tr>
<td></td>
<td>28. Tibiae: round in cross-section (p), explanate (a).</td>
</tr>
<tr>
<td></td>
<td>29. Metacoxal, lateroapical margin: even rounded (p), emarginate (a), with acute tooth (a1).</td>
</tr>
<tr>
<td></td>
<td>30. Tarsal claws: simple, base slender (p), simple, base swollen (a), appendiculate (a1).</td>
</tr>
</tbody>
</table>

Fig. 6. Cladogram showing relationships of Paratrachys (length 197, CI 87, RI 81).
Table 3. Character state matrix
[pleiomorphic (p), 0; apomorphic (a, a\(^1\), a\(^2\)), 1, 2, 3; ?, missing data or absent character]

| Taxon          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|----------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Acmaeoder      | 0 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 1 2 | ? | ? | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 2 |
| Acmaeoderoides | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 2 |
| Nothomorpha    | 0 | 1 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Paratrachys    | 0 | 1 | 0 | 1 | 0 | 3 | 1 | 1 | 1 | 2 | ? | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| Ptosima        | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 2 |
| Sponsor        | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 2 |
| Trachytele     | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Xyrosceles     | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |

Table 4. Number of changes of state, consistency index (CI), retention index (RI) values, best and worst fits for 30 characters used in Hennig86 analysis for one tree of length 197, CI 87, RI 81

| Character | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|-----------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Steps     | 1 | 1 | 2 | 1 | 2 | 4 | 3 | 2 | 2 | 4 | 4 | 2 | 3 | 1 | 1 | 6 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 3 |
| CI        | 100|100|50 |100|50 |75 |33 |50 |50 |50 |50 |66 |100|100|100|50 |100|33 |100|50 |50 |50 |100|100|66 |100 |100 |66 |66 |
| RI        | 100|100|50 |100|0  |80 |0  |0  |0  |33 |0  |0  |100|100|100|0  |0  |100|50 |50 |50 |66 |100|100|0  |0  |100|66 |66 |50 |
Cobos) and *Nothomorpha verrucosa* (Gory & Laporte) (Nothomorphina Cobos) were added because of the confusion about their relationship and proper placement with regard to other examined taxa; the former is Australian and the latter African, a geographic parallel to the situation of *Paratrachys* and *Sponsor*. In addition, to help define polarity, one taxon from the tribe Acmaeoderini Kerremans was included because of the general perception that taxa of this group represent a highly derived lineage within the otherwise primitive part of the family. *Trachykele* Marseul (Trachykelina Hołyński, Anthaxiini Gory & Laporte) was selected as the working outgroup because of earlier comments by Hołyński (1988) where he said of *Trachykele*, together with *Nascio* Laporte & Gory (Nascioniina Hołyński), that 'both these subtribes seem to represent relatively little modified offsprings of the ancient stock, ancestral to all the Buprestinae' and because all remaining taxa had putative apomorphic character states in common with others of the included taxa. Neither the taxa nor the characters were considered ordered.

The phylogenetic analysis resulted in a single cladogram (length = 197, CI = 87, RI = 81) (Fig. 6). The characters examined and the respective state of each for each taxon are shown in Table 2 while the character state matrix is presented in Table 3. The number of changes of state, consistency index and retention index values for each character used in the analysis are listed in Table 4. The monotypic status for Paratrachydina is confirmed by the distance of the branching between the three taxa of Ptosimina (*Ptosima, Sponsor* and *Acmaeoderoides* Van Dyke) and *Paratrachys* where these two subtribes are separated by taxa from two other subtribes. The distal grouping of *Paratrachys* and *Acmaeodera* should not imply any strong relationship as they are most probably correctly placed in two different tribes. However, the fact that *Paratrachys* is shown to diverge from *Acmaeodera* in this rather limited analysis does support the idea that *Paratrachys* is probably the most derived taxon in its lineage evidenced by morphology and biology.

One other aspect of this analysis of interest is the distance in branching between *Xyroscelis* Saunders and *Nothomorpha* Thomson. These two taxa were combined by Hołyński (1993) into the Nothomorphina, but this grouping is not supported by this analysis. A separate project will attempt to resolve this question.

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