

A new genus of Permian Plecoptera (*Afroperla*) from KwaZulu-Natal, South Africa

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During the compilation of an inventory of Upper Permian Beaufort Group fossil insects (Van Dijk & Geertsema 1999) the Plecoptera (Perlaria, stoneflies) were overlooked. Apart from listing, there was at that time little to add as the known fossils, both those at the Natal Museum and those at the Bernard Price Institute, had received a thorough treatment in Riek (1976a). Since then notably two wings have been collected, one of which is here described.

The group is known from the Permian to the present (Illies 1965; Kukalová-Peck 1991). It is a relatively small order, with numbers especially limited in the southern hemisphere. There are only seven genera based on adults in the Permian, four from east of the Urals (*Palaeoperla* Sharov, 1961, *Perlopsis* Martynov, 1940, *Palaeonemoura* Sharov, 1961, *Palaeotaeniopteryx* Sharov, 1961), one from New South Wales, Australia (*Stenoperlidium*), and two described from Mooi River, KwaZulu-Natal (Riek 1973, 1976a; reviewed by Carpenter 1992). The following species have been named from the Permian Beaufort of South Africa: *Euxenoperla simplex* Riek, 1973 (Mooi River), *E. similis* Riek 1973 (Wagondrift Dam), *E. oliveri* Riek, 1976 (Lidgetton) and *Euxenoperlella jacquesi* Riek, 1976 (Mooi River).

In this contribution, a new genus and species of Permian Plecoptera are described, based on a forewing from a quarry in Bulwer, KwaZulu-Natal, situated near the Permian/Triassic boundary (Van Dijk 1997).

Genus *Afroperla* gen. nov.

Etymology. From Africa and the latin *perla*.

Gender. Feminine.

Type species. *Afroperla permiana*, by present designation.

Description. Subcostal vein Sc approaching costal margin near middle of wing. Radial vein R distally with veinlets to costal margin. Radial sector Rs at least two-branched. Cross-vein between R and Rs about two thirds along wing, where veins are diverging. Medial M diverges from R about one sixth along wing, branching near middle of wing into two branches; branch from near divergence

from R meeting anterior cubital CuA. CuA four-branched. Posterior cubital CuP unbranched. Three anal veins. No marked cross-veins distal to the R–Rs cross-vein.

Familial placement. *Afroperla* has similarities to *Palaeonemoura*, which, however, has a three-branched CuA, whereas that of *Afroperla* is four-branched. Placement in the family Palaeonemouridae is suggested by N.D. Sinitshenkova (in litt.), although this would involve changing the diagnosis of the family accordingly.

Afroperla permiana sp. n., Figs 1, 2

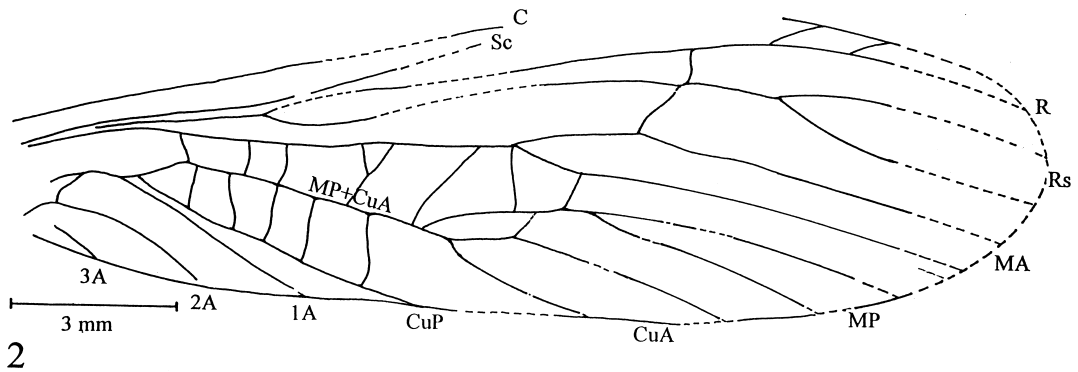
Etymology. From the Permian System.

Holotype. NM 2733 a, b in Natal Museum, Pietermaritzburg (NM).

Type locality. Bulwer, KwaZulu-Natal, in a quarry at the northern end of the town (29°48'S 29°46'E).

Description. Forewing complete except for apex and extreme base, total length circa 19 mm, middle of wing anteriorly obscured by matrix. Sc strong, oblique vein to costal margin near mid-wing. Faint indications of veinlets from Sc to costal margin. R with at least two veinlets to costal margin beyond R–Rs cross-vein. Rs originating from R about one quarter from base of wing, curved towards R, then diverging, bifurcating beyond cross-vein from R. At same level as R–Rs cross-vein, cross-vein from Rs extending obliquely proximally to MA. M originates with R near base of wing. M divides at about middle of wing into two branches, MA and MP, with another short branch in proximal quarter of wing, meeting CuA near its origin. CuA four-branched, CuP undivided, followed by 1A, 2A and 3A. System of cross-veins between M and CuA and another between MP and CuA, but no distinct cross-veins in posterodistal part of wing beyond single Rs–MA cross-vein. The counterpart, NM 2733b, adds little to that seen in NM 2733a, other than showing the thick vein from M converging with CuA.

Remarks. *Afroperla* does not appear to have close affinities with any of the seven described Permian genera, although it shows some resemblance to *Palaeonemoura* Sharov 1961, from which it differs in



Figs 1–2. *Afroperla permiana*, NM 2733a. **1.** Holotype forewing (scale bar = 1 mm).; **2.** diagram of holotype forewing, based mainly on NM2733a.

the branching of the CuA and in having two veinlets from R to the wing margin. Recognizing *Afroperla* as a member of the, necessarily emended Palaeonemouridae, indicates its apparent remoteness from extant South African genera. The other South African fossil genera *Euxenoperla* and *Euxenoperlella* were tentatively placed by Riek (1973, 1976a) in the family Gripopterygidae. This classification was repeated by Carpenter (1992), but with neither an indication that it is derived from Riek, nor further discussion of the family. He also made no reference to Riek (1973) having transferred the Australian *Stenoperlidium triassicum* to the genus *Euxenoperla*, a Triassic fossil, nor *E. clara* having been placed in this genus by Riek (1976b). Of the Triassic South American genus *Gondwanoperlidium* Pinto & Purper, 1978, Carpenter (1992: 97) commented: 'Little-known genus, similar to *Euxenoperla*, but fore wings with many

more crossveins.' The Gripopterygidae is an extant family known from Australia, New Zealand, South America and Fiji (Theischinger 1991). In *Euxenoperla* and *Euxenoperlella* there is a crossvein to R close to the forking of the Rs, approximately one quarter of the distance between the fork and the apex in *Euxenoperlella* and a smaller fraction of this distance in *Euxenoperla*; in *Afroperla* there is no cross-vein between R and Rs in the estimated one third of the distance from the Rs fork to the missing apex, while, by contrast, Riek (1976b) includes the presence of at least three radial cells in his diagnosis of his subfamily Eustenoperlinae. In *Afroperla* before forking the Rs curves away from R. After forking the preserved parts of the anterior and posterior branches of Rs are almost parallel to R and MA, respectively. CuA (MP + CuA in Tillyard 1931; Sharov 1961; Carpenter 1992) is four-branched, while it is two-

branched in *Perlopsis* and *Euxenoperla* and probably in the type species of *Paleotaeniopteryx* and *Palaeonemoura*, and three-branched in *Stenoperlidium*, *Stenopermanium* and *Palaeoperla*.

The Bulwer site, by virtue of being close to the Permo-Triassic boundary, and hence the great Permian extinction event, is of great importance. No more insect fossils can be collected from this

site before steps are taken to re-expose the fossiliferous strata in what remains of the site (Geertsema *et al.* 2002).

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