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## THE ASTEROLECANIIDAE (HEMIPTERA: COCCOIDEA) OF SOUTH AFRICA.

### ABSTRACT

THE ASTEROLECANIIDAE (HOMOPTERA: COCCOIDEA) OF SOUTH AFRICA.

The 16 species of Asterolecaniidae known from South Africa can be tentatively placed in six genera based on the characters of the adult female. Some species do not fit into these genera as presently defined, requiring a redefinition of some genera or the creation of new ones. However, it appears that the characters on which the genera of the Asterolecaniidae are presently based are too few in number and unreliable, making a detailed study of other characters of the female and eight other stages necessary for a better understanding of the relationships within this family.

Key words: pit scales, taxonomic characters, taxonomy, *Abditococcus*, *Asterodiaspis*, *Asterolecanium*, *Bambusaspis*, *Planchonia*, *Russellaspis*, *Amorphococcus acaciae*.

The known Asterolecaniidae (pit scales) of South Africa comprise 15 species, with an additional undescribed species. This fauna is relatively rich, considering that North America has only about 27 species in four genera (Kosztarab, 1996) and Central Europe six species in two genera (Kosztarab & Kozár, 1988). Furthermore, the South African scale insect fauna is still poorly surveyed. Of the indigenous species, six were described by Brain (1918, 1920), one by Fuller (1899a, 1899b), one by Russell (1941) and one by Giliomee & Munting (1968); the others are cosmopolitan species. The species described by Fuller and Brain (except *Amorphococcus acaciae*), as well as the exotic species, were all included in the genus *Asterolecanium* by Russell (1941), who described or redescribed the species in her monumental monograph on 160 species and varieties. According to Russell (1941), the genus comprises “an extremely homogeneous array of species”, although she still divided the species into 12 “groups”. However, workers before and after Russell placed many of her species in other genera, especially Borchsenius (1960) in his comprehensive work on the Asterolecanidae of the USSR. In fact, Borchsenius (1960) recognized 11 genera for his 40 pit-scale species, which he put into the subfamily Asterolecaniinae. How, then, should the South African species in the Asterolecaniidae be classified?

It seems that, based on our existing knowledge, the species can be placed in six genera, i.e. *Abditococcus* Lambdin & Kosztarab, *Asterodiaspis* Signoret, *Asterolecanium* Targioni Tozzetti, *Bambusaspis* Cockerell, *Planchonia*

Signoret and *Russellaspis* Bodenheimer, although some species cannot be placed with confidence in these genera.

The genus *Abditococcus* was established as a monotypic genus by Lambdin & Kosztarab (1975) for the species which Brain (1918) described as *Amorphococcus acaciae*. Amongst the characters that Lambdin & Kosztarab used to distinguish this genus from other asterolecaniids were the presence of fused anal plates and a minute arched plate surrounding the anal ring, and the absence of a marginal row of quinquelocular pores and 8-shaped pore bands on the ventrum.

Four species can be placed in the genus *Asterodiaspis*, i.e. two exotic species found on oak: *A. variolosa* (Ratzeburg) and *A. quercicola* (Bouché), and two indigenous species: *A. borboniae* (Brain) and *A. brevispinum* (Brain). *Asterodiaspis* is characterized by: the reduced anal ring which has no pores and only 0-2 short setae, and anal lobes that are absent or only weakly developed (Borchsenius, 1960; Kosztarab & Kozár, 1988). Borchsenius (1961) regarded these characters as specialized. *A. borboniae* and *A. brevispinum* have been placed in *Asterodiaspis* on the basis that the anal ring is very small and without setae, as depicted by Brain (1920), although Russell (1941) indicates a bigger anal ring (without setae) for *A. borboniae* in her redescriptions of the two species. According to Russell (1941), the two species did not fit into any of her 12 “groups”. *Asterodiaspis* is the largest genus in the Asterolecaniidae in the former USSR, containing 17 of the 40 species described by Borchsenius (1960).

The genus *Asterolecanium* is represented by only one species, i.e. the new species we are describing elsewhere. It is considered to belong to this genus as it is near to *Asterolecanium machili* Russell (Russell, 1941) which, in the sense of Borchsenius (1960), belongs to *Asterolecanium sensu stricto*. Also, the anal ring (with setae and pores) is at the base of an anal tube with almost parallel walls. This character and others fit the descriptions of the genus by Borchsenius (1960) and Williams & Watson (1990). However, it also shows similarities with some *Bambusaspis* species, but lacks the characteristic dorsal tubes of this latter genus.

South Africa has three species in the genus *Bambusaspis*, namely *B. bambusae* (Boisduval), *B. miliaris* (Boisduval) and *B. pseudomiliaris* (Green). The first two species were originally described from Algeria and the third from Sri Lanka, but today all three are cosmopolitan species occurring on leaves and stems of bamboo. Cockerell (1902) erected the genus for some of these and a number of other species living on bamboo. They are all characterized by a pair of relatively large tubular ducts (dorsal tubes) near the

posterior end of the body. Russell (1941) lists 47 species in this group, which is by far the largest of her 12 groups.

The species *Asterolecanium stentae* (Brain) was included by Russell (1941) in her “Group IV”, together with *A. fimbriatum* (Fonscolombe) for which Signoret (1870) established the genus *Planchonina*. Bodenheimer (1951) indicated that all the species in Russell’s Group IV should be included in *Planchonina*, so that the South African species becomes *Planchonina stentae*, as indicated by Borchsenius (1960). A double or triple row of marginal 8-shaped pores on the anterior part of the body is characteristic for this genus (Russell, 1941; Borchsenius, 1960; Kosztarab & Kozár, 1988). The arched plate anterior to the anal ring is also conspicuous in the genus.

The rest of the South African species, i.e. *brachylenae* (Brain), *conspicuum* (Brain), *euryopis* (Fuller), *euphorbiae* (Russell), *pustulans* (Cockerell) and *proteae* (Giliomee & Munting), are placed in the genus *Russellaspis*. The genus was established by Bodenheimer (1951) for the “Group XI” species of Russell (1941) with the cosmopolitan *R. pustulans* as the genotype. This was accepted by Borchsenius (1960), who suggested that the South African species *Asterolecanium conspicuum* and *A. euphorbiae* Russell should also belong in this genus. Russell (1941) included *A. conspicuum* in her “Group XI”, but could not fit *A. euphorbiae* into any of her groups.

Russell (1941) defined her “Group XI” as adult females having a row of marginal 8-shaped pores together with parallel rows of marginal quinquelocular pores and disc-pores, as well as elongate sclerotized areas ventrally on the apex of the abdomen. The characters of *A. pustulans* (genotype), *R. conspicuum* and *R. proteae* correspond with this description. However, the species *R. brachylenae*, *R. euryopis* and *R. euphorbiae* deviate in various aspects. Thus, *R. brachylenae* has a double row of marginal 8-shaped pores, although it is similar to the main group in possessing the ventral sclerotized areas. *R. euphorbiae* differs from Russell’s (1941) definition of “Group XI” in that the marginal quinquelocular pores do not extend up to the terminal marginal 8-shaped pores and it lacks a row of marginal disc-pores and the sclerotized areas ventrally near the apex. It also lacks the scattered 8-shaped pores on the dorsum as found in the genotype. In fact, it is difficult to see why Borchsenius (1960) suggested that this species belongs in *Russellaspis* and one wonders whether he did not mistake Russell’s (1941) Fig. 23C of *Asterolecanium euryopis*, showing the scattered 8-shaped pores on the dorsum, for *A. euphorbiae* which appears on the same page as Fig. 23A. However, the anal structures of *R. euphorbiae*, as depicted by Russell in Fig. 23A, do appear to be rather similar to those shown by Borchsenius

(1960) for *R. pustulans* in his Fig. 107. *R. euryopsis* lacks the distinct marginal row of 8-shaped pores and the marginal quinquelocular and disc-pores, as well as the typical sclerotized areas near the apex ventrally, but resembles the genotype in possessing the scattered 8-shaped pores on the dorsum, which, in this wax secreting species, is particularly large and distinctly invaginated (Russell 1941). Like *R. euphorbiae*, it was not placed in any of Russell's (1941) groups.

It is clear that quite a number of the South African species cannot be placed with confidence in existing genera as they are presently defined (especially those in *Russellaspis*) and Russell (1941) herself was unable to fit four of them into any of her 12 groups. Placement of these species will require either that the generic characters be expanded to include these species or that new genera be created for them. However, the characters by which the genera are presently differentiated are few in number, being mostly the anal structures and particularly the distribution patterns of the various pores. The latter are variable and can be influenced by climatic factors during development (P. Lambdin, pers. comm.). There is, therefore, a great need for a careful study of other characters over a range of species for useful defining characters. In this regard, the studies on the ultrastructure of the wax glands by Foldi & Lambdin (1995) are an excellent contribution. Furthermore, the juvenile stages and the males (where present) should be described in detail, as was done by Giliomee & Munting (1968).

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