

FIRST INCURSION OF *CONTIGASPIS ZILLAE* (HEMIPTERA: DIASPIDIDAE) IN BRITAIN

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ABSTRACT

In November 2009, a large infestation of the scale *Contigaspis zillae* (Hall) (Hemiptera: Diaspididae) was found on four *Crassula ruprestis* Thunb. plants grown under glass at the Royal Horticultural Society's Garden, Wisley, Surrey, England. The plants had been imported from South Africa in May 2008. This is the first incursion of this scale insect in Britain and control measures are being taken. The biology and geographical distribution of *C. zillae* are discussed.

INTRODUCTION

Succulent plants that had originally been imported from South Africa and exhibited at The Royal Horticultural Society's (RHS) Chelsea Flower Show on the Kirstenbosch National Botanic Garden stand in May 2007 and 2008 were donated to the RHS Garden, Wisley, Woking, Surrey, where they were maintained in heated glasshouses. In October 2009, one of these plants (*Euphorbia caput-medusae* L. (Euphorbiaceae)) that had been imported in 2007 was found to be heavily infested with white euphorbia scale *Selenaspidus albus* McKenzie (Hemiptera: Diaspididae) (Malumphy & Halstead, 2010). Further investigations of the South African plants by RHS staff in November 2009 led to the discovery of two more non-native diaspid scale insects on plants imported in 2008: *Contigaspis zillae* (Hall) on four 'kebab bush', *Crassula ruprestis* Thunb. (Crassulaceae), plants and an unidentified species on a woody *Geranium* sp. (Geraniaceae). In each case samples of the infested plants were submitted to The Food and Environment Research Agency (Fera), Sand Hutton, York, for identification. The infestation on the *Geranium* sp. consisted mainly of empty male scale tests (covers) and a small number of adult females that were post-reproductive, dead, shrivelled and full of fungal hyphae. It was therefore not possible to identify the species. In contrast, the infestation of *C. zillae* on the *C. ruprestis* was thriving and there were hundreds of live scales present in the small plant sample examined by Fera. Most were live first instars and mature adult females but there were also large numbers of empty male scale tests.

Contigaspis zillae has been intercepted in Britain on two previous occasions, both at the Royal Botanic Gardens (RBG), Kew, Surrey: on *Caralluma* sp. (Apocynaceae) imported from Saudi Arabia (a small number of dead adult females, immatures and male tests), May 1981; and on *Crassula* sp. from South Africa, 11 November 1994 (many live adults and immatures). Other *Contigaspis* species have also been intercepted at the Royal Botanic Gardens on three occasions: on *Stapelia* sp. (Apocynaceae) plants imported from South Africa, 1986; *Caralluma* sp. and *Huernia* sp. (Apocynaceae) from Saudi Arabia, 1988; and *Haworthia retusa* f. *geraldii* (C.L. Scott) J. Pilbeam (Asphodelaceae) from South Africa, 1999. The specimens in the latter samples did not match any published descriptions and may represent undescribed species. However, several of the *Contigaspis* species are poorly known.

The purpose of this communication is to report the first incursion of *C. zillae* in Britain and to review its geographical distribution and biology.



Fig. 1 Infestation of *Contigaspis zillae* on *Crassula ruprestis*. Six male tests and a single adult female scale (on the right).

Slide-mounted specimens of *C. zillae* have been deposited at the Food and Environmental Research Agency, Sand Hutton, York. The host plant classification follows Mabberley (2008) with some names updated by Christopher Whitehouse, RHS Herbarium Keeper.

DETECTION AND IDENTIFICATION

The following observations are based on the scales collected at the Royal Horticultural Society's garden at Wisley. All developmental stages occurred on the green parts of the host plant (Fig. 1). The majority of the scales were found on the foliage rather than the stems. The adult female scale covers were 1.5 mm in length, pear shaped, strongly convex, and white with yellow, apical exuviae. Adult female bodies varied in colour from yellow-orange to pinkish to brown, becoming darker with maturity. The first instars were bright yellow, and the dark contents of their intestines were visible through the dorsum. Male scale covers were smaller than the female, each being 1.0 mm in length, elongate, flat or gently tricarinate, white with yellow exuviae situated at the anterior margin.

Contigaspis zillae was originally described by Hall (1923, as *Pinnaspis zillae*) from specimens collected from *Zilla spinosa* (L.) Prantl (Cruciferae) in Egypt. It was reassigned to the genera *Eresmaspis* and, subsequently, *Contigaspis* by Bodenheimer (1951, 1953). *Contigaspis zillae* is morphologically highly variable and has been described under three other names: *Pinnaspis acantholimoni* Bodenheimer (1949) from specimens collected from *Acantholimon* sp. (Plumbaginaceae) in Turkey; *Contigaspis monticola* Borchsenius (1949) from specimens collected from an

unknown host in Tajikistan; and *Contigaspis borchsenii* Bazarov (1967) from specimens collected from *Centaurea squarrosa* Willd. (Compositae) in Tajikistan.

Detailed morphological descriptions and illustrations of adult females are given by Hall (1923) and Borchsenius (1949). Borchsenius & Williams (1963a) also provide a good taxonomic illustration. Takagi & Moghaddam (2005) discuss morphological variation in the adult female. There are currently 14 species assigned to the genus *Contigaspis* and Borchsenius & Williams (1963b) provide a key to the world fauna.

HOST RANGE AND BIOLOGY

Contigaspis zillae is polyphagous, feeding on the following plants: **Amaranthaceae:** *Kochia prostrata* (L.) Schrad. **Apocynaceae:** *Calotropis procera* (Aiton) W.T. Aiton, *Caralluma* sp., *Pergularia tomentosa* L. **Boraginaceae:** *Heliotropium* sp., *Trichodesma africana* Harv., *T. calcaratum* Batt. **Capparaceae:** *Capparis* sp. **Caryophyllaceae:** *Telephium sphaerospermum* Boiss. **Compositae:** *Centaurea squarrosa*, *Helichrysum* sp. **Crassulaceae:** *Crassula rupestris* (a new host record reported here), *Crassula* sp. (a new host record reported here). **Cruciferae:** *Farsetia aegyptiaca* Desv., *Zilla spinosa*. **Cucurbitaceae:** *Citrullus colocynthis* (L.) Schrad. **Labiatae:** *Scutellaria semenovi* Regel., *S. vilutina* Juz. & Vved. **Plumbaginaceae:** *Acantholimon* sp. **Resedaceae:** *Ochradenus baccatus* Delile, *Reseda pruinosa* Fresen. **Rutaceae:** *Haplophyllum* sp. **Santalaceae:** *Osyris alba* L. **Umbelliferae:** *Deverra tortuosus* (DC.) Benth. ex Asch. & Schweinf., *Deverra* sp., *Pycnocycla spinosa* Decne. & ex Boiss, *Pycnocycla* sp. (Bazarov, 1967; Bazarov & Shmelev, 1971; Bodenheimer, 1926; Borchsenius, 1949; Borchsenius & Williams, 1963b; Hall, 1923, 1925, 1926, 1927b; Kaussari, 1955; Rungs, 1942, 1943).

The biology of *C. zillae* has not been studied in any detail. However, it reproduces sexually, and the females lay eggs. The sex ratio in the sample from the infestation at the Royal Horticultural Society, Wisley was approximately four male tests to each adult female. Almost all the live scales were first instars and mature adult females. There were no signs of parasitism or predation in the population.

GEOGRAPHICAL DISTRIBUTION

Contigaspis zillae occurs widely in Africa and the Middle East and is found in adjacent parts of Asia.

Afrotropical: Cameroon (Borchsenius & Williams, 1963b); Mauritania (Rungs, 1942); Nigeria (Borchsenius & Williams, 1963b); South Africa (new country record reported here). **Oriental:** Pakistan (Varshney, 2002). **Palaeartic:** Afghanistan (Kozár *et al.*, 1996); Armenia (Borchsenius, 1949); Egypt (Hall, 1923); Iran (Borchsenius & Williams, 1963b; Kaussari, 1955); Israel (Hall, 1927a); Morocco (Borchsenius & Williams, 1963b); Russia (Borchsenius & Williams, 1963b); Saudi Arabia (Matile-Ferrero, 1988); Tajikistan (Bazarov, 1962); Turkey (Borchsenius & Williams, 1963b); UK (a single incursion reported here, being subjected to control measures aimed at eradication).

DISCUSSION

This is the first known incursion of *C. zillae* in Britain and it is currently being controlled. It is a sub-tropical/warm temperate species that is unlikely to be able to overwinter outdoors in Britain but could establish in glasshouse botanical collections (it was breeding at the Royal Horticultural Society, Wisley for 19 months). It is

polyphagous, feeding on plants belonging to at least 15 families including some that are commercially important in Britain, e.g., Cruciferae and Cucurbitaceae. However, it is not recorded causing any economic damage although infestations can be conspicuous and lower the aesthetic value of ornamental plants. The distribution, host range and biology of *C. zillae* are poorly known. This is due in part to difficulties in identifying the scale, as it exhibits a wide range of morphological variation.

Any findings of suspected non-native plant pests should be reported to the Plant Health and Seeds Inspectorate HQ, York (Tel.: 01904 465625).

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