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The cigarette beetle *Lasioderma serricorne* (F.) (Coleoptera: Anobiidae): a serious herbarium pest

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ABSTRACT

The herbarium pest *Lasioderme serricorne* (F.) is described and illustrated, and aspects of its life cycle and eradication are discussed.

UITTREKSEL

Die herbariumplaag *Lasioderme serricorne* (F.) word beskryf en geïllustreer, en aspekte van sy lewensiklus en uitroeiing word bespreek.

INTRODUCTION

One serious curation problem in herbaria is the protection of specimens from damage by insects. In the past, various animal pests have occurred in the National Herbarium, Pretoria (PRE): cigarette beetles, cockroaches, rats and fish moths. Of these, *Lasioderme serricorne* (F.), the cigarette beetle or tobacco beetle, has caused the most severe damage to herbarium specimens. Recently, infested material received from a collector and damage done to specimens in the cupboards again drew attention to this beetle.

FIGURE 1.—Scanning Electron Micrograph of a mature cigarette beetle, *Lasioderma serricorne*, × 50.

DISCUSSION

The insect

Lasioderme serricorne (Fabricius) was first described in France in 1792 from specimens collected in America, but the oldest record of occurrence of the tobacco beetle comes from Egypt, remains of the insect having been found in the tomb of Tutankhamen. These beetles are therefore probably indigenous to Egypt, and they have scarcely altered morphologically in the 3 500 years that have elapsed (Reed & Vinzant 1942). The insect has gained a wide distribution through commerce and is nowadays found throughout the tropical and subtropical parts of the world.

The adult beetle (Figure 1) is small (2,0–3,7 mm), reddish brown, and its head is retracted under the front part of the body. Distinguishing characteristics include the smooth elytra and serrate antennae (Croat 1978). The similar drugstore beetle, *Stegobium paniceum* (L.), which is also extremely common and also occurs on a wide range of products, possesses distinctly grooved elytra and clubbed antennae. Cigarette beetles are slow flyers and can easily be spotted when flying.

L. serricorne females oviposit directly onto dried material. The eggs are pearly white and elongated and hatch in 6–8 days. The larvae, ± 3 mm long, are C-shaped, greyish white and thinly covered with fine brown hairs (Figure 2). When growth is completed, the larva trans-

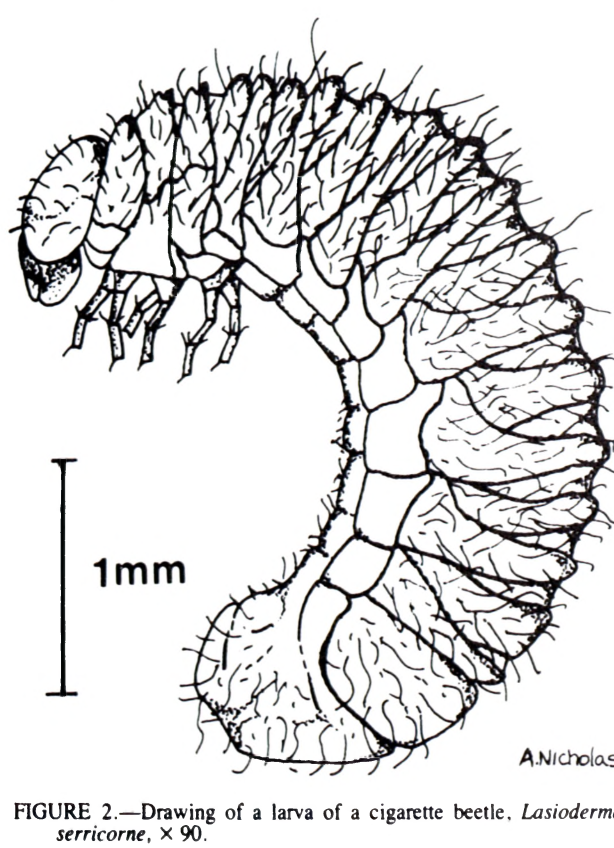

FIGURE 2.—Drawing of a larva of a cigarette beetle, *Lasioderma serricorne*, × 90.

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forms into an inactive pupa and emerges a fully developed beetle in about 7 days in summer and 14–18 days in the cooler weather of spring and autumn (Reed & Vinzant 1942).

The complete life cycle of *L. serricorne* spans about 45–70 days, and 3–6 generations occur per year, depending on the availability of food, as well as temperature and humidity (Edwards *et al.* 1980). Huge populations of *L. serricorne* can build up very quickly—a protected breeding pair produced 2 000 offspring in four months (Howe 1957)—and infestations and damage can reach alarming proportions before adults are spotted. *L. serricorne* can breed on a wide variety of commodities including herbarium specimens, insecticides containing pyrethrum, animal matter such as dried insects and dried fish, leather, cloth, paper and books (Lever 1945, Mossop 1950, Howe 1957). Symbiotic yeasts, which occur intracellularly in mycetomes at the junction of the fore- and mid-gut, supply B-group vitamins in significant amounts and make it possible for *L. serricorne* to subsist on foods very low in vitamins of that group (Pant & Fraenkel 1950). The yeasts also supply their hosts with sterols, a necessary constituent of their diet. In the absence of any other food the newly hatched larva may eat the egg shell. They are negatively phototropic and will enter very small holes in search of food (Howe 1957), and evidence at PRE also suggests that they can find their way into tightly closed cabinets. Experiments have shown that the tobacco beetle can exist at temperatures between 2 °C and 36 °C (Powell 1931); however, the beetle will tolerate a much wider range in temperature, and all stages of the life cycle may survive temperatures below 2 °C. According to Powell (1931), the greatest numbers of tobacco beetles complete their life cycles at humidities of about 75 per cent; humidities above 90 per cent are unfavourable because of the attack by fungal and bacterial diseases. It is likely that only the eggs and young larvae are vulnerable to low humidity and that the later stages may survive several months at low humidity (Howe 1957).

Damage

Both the adult and larval stages of the life cycle are capable of feeding (Lefkovitch 1963). The most severe damage is done to the flowers of herbarium specimens, although leaves and stems are also eaten (Figure 3). Seeds inside fruits of exposed material are usually severely attacked. Plant parts are turned into a mixture of dust and faeces (Figure 4).

FIGURE 3.—Herbarium specimen, *Senecio* sp., severely damaged by cigarette beetle, × 0,8.

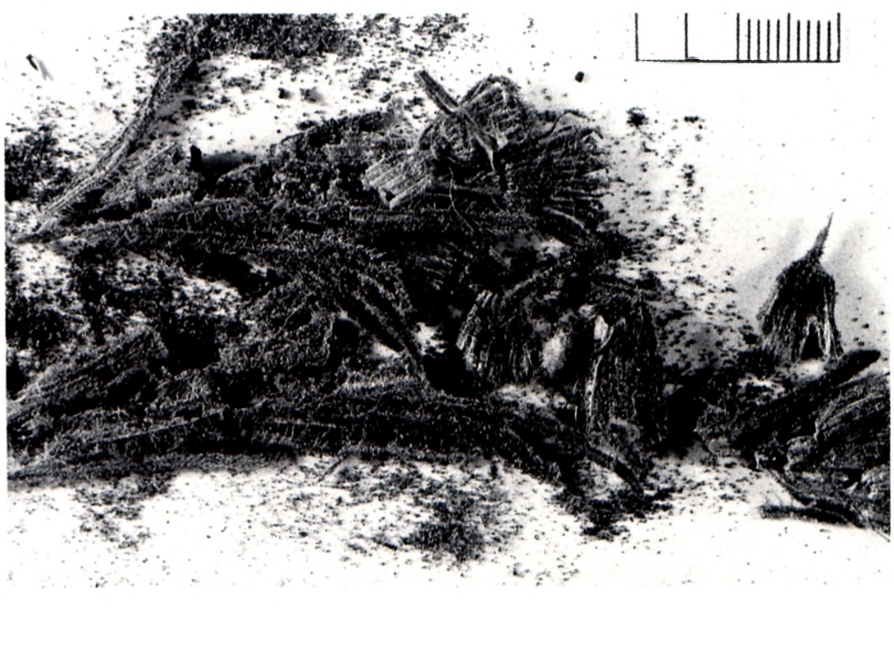

FIGURE 4.—Herbarium specimen, *Senecio* sp., damaged by cigarette beetle. Plant parts have been turned into a mixture of dust and faeces, × 1,5.

Eradication

Two basic approaches are usually taken to control pests in herbaria, namely 1, the sterile entry approach, i.e. building closure coupled with humidity control, temperature control and sterile entry techniques; and 2, fumigation, i.e. the use of short or long duration fumigants or poisons in direct association with the herbarium specimens (Croat 1978). At present in PRE all incoming material is treated in the service room by freezing (deep freeze temperature averages −6 °C) for two days or by heating in a microwave oven for six minutes (100 mm pile) to kill any insects present. The herbarium and associated rooms are fumigated once a year and paradichlorobenzene has been put into herbarium cabinets regularly to act as a repellent. However, because of a recent outbreak of cigarette beetle, present insect pest control measures at PRE are undergoing critical examination, and new control measures are to be tested. Recent outbreaks of the beetle were isolated and the contaminated specimens either microwaved or frozen. Some of the contaminated cupboards were fumigated using Vapona* strips (dichlorvos), while others were sprayed with Baygon knockdown* spray. This is a 'dry' spray that can be sprayed directly onto mounted specimens without marking or damaging them, the active ingredients being dichlorvos, a pyrethroid (tetramethin) and a synergist (piperonylbutoxide). These measures have proved successful in controlling the infestations. An initial treatment with commercially available fumigating tablets proved unsuccessful.

CONCLUSION

Herbarium specimens and their associated mounting boards, species covers, genus covers and wooden cabinets are all susceptible to attack by insect pests. Infestations that go unnoticed or untreated can cause extensive, irreversible damage. Collections that have taken time, effort and money to compile can be completely destroyed. No herbarium can afford to let this happen, especially when historically valuable collections and type specimens are involved. The control and eradication of a pest like *L. serricorne* in herbaria is therefore of utmost importance to curators.

* Mention of a trade name does not imply its approval to the exclusion of other products.

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