conidia and hence, the present collection has been described here as a new species with the following format description :

Dichomera trichurensis sp. nov. (Fig. 1)

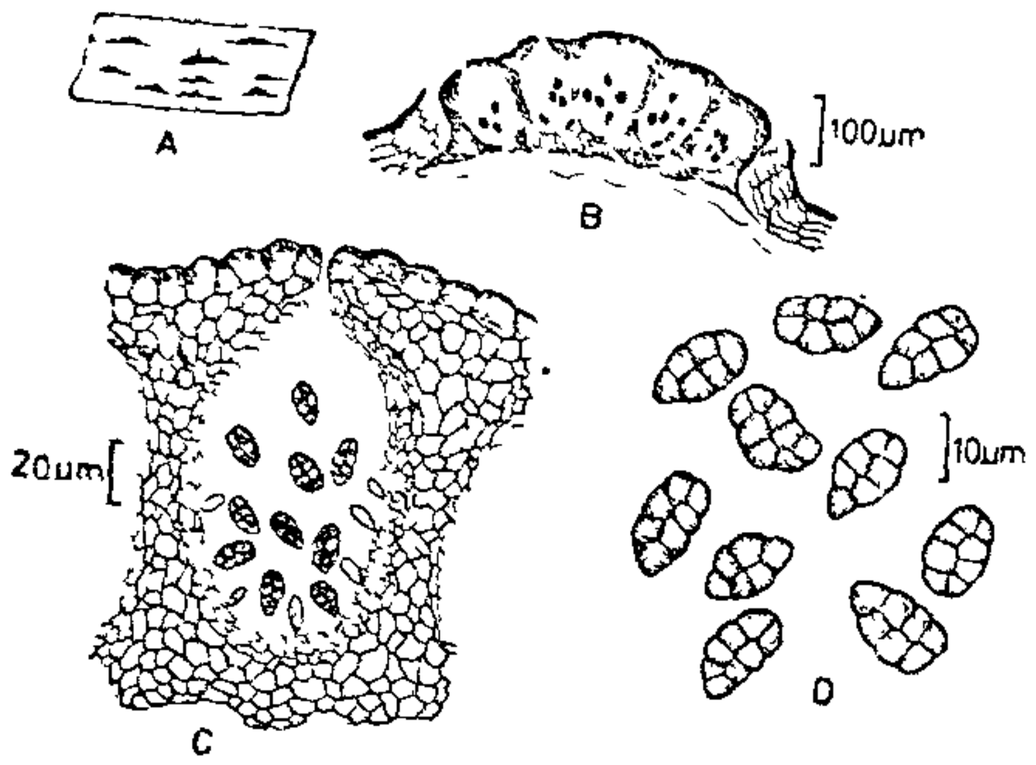

FIG. 1. *Dichomera trichurensis* sp. nov. A, Habit; B, V.S. of stroma; C, V.S. of pycnidium showing conidia; D, Conidia (Pycnidiospores).

Stromata dothidioidea, erumpentia, corticem disrumpentia, nigra, usque ad 1·5 mm magnitudine. Pycnidia immersa, binaquina in stromata, sphaerica vel globoidea, ostiolata, magnitudine 100–150 µm diam. Conidiophora hyalina, erecta, non-septa, usque ad 8 µm longa. Conidia globosa vel ellipsoidia, sicca, multiseptata, muriformia, atro-brunnea vel rufe-brunnea, magnit. 12–16·5 × 6–9 µm.

Stromata dothidioid, immersed in the substrate finally becoming erumpent, black, upto 1·5 mm long. Pycnidia globose to spherical, ostiolate, black, grouped in a stroma (upto 7 per stroma) measure 100–150 µm in diam. Conidiophores simple, hyaline, non-septate and measure upto 8 µm long. Conidia globose to ellipsoid, dry, muriform, several-celled with oblique septa (normally with 3 transverse septa and one oblique septa) dark-brown to reddish-brown, measure 12–16·5 × 6–9 µm.

Matrix : On dead twigs of *Nerium odorum* Soland (F. Apocynaceae) Leg. K.I.M.V. at Peechi Forest, Trichur (Kerala), on 25-10-1975, No. AMH 3837 (Holotypus).

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ON THE FOOD PREFERENCE AND THE MORPHOLOGICAL ADAPTATIONS OF THE GUT OF SOME SPECIES OF ORTHOPTERA

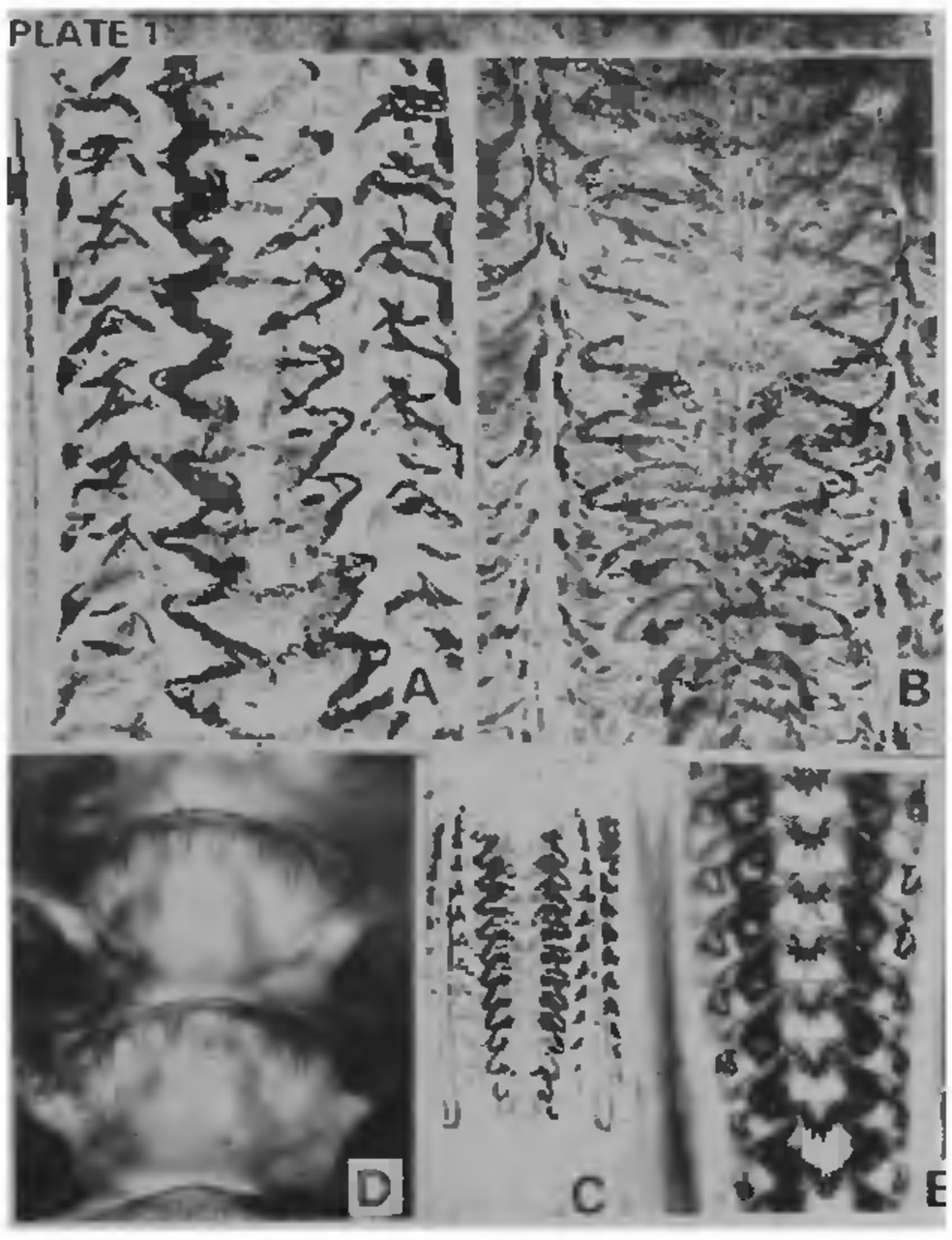
UVAROV[1] has suggested that food preference among Orthopterans can be correlated with certain morphological features of the digestive system. An attempt has, therefore, been made to correlate the type of food with the structural adaptations of the gut. The following species of insects have been studied:

Gryllotalpa africanus Chopard (=*G. fossor* Scud.)
Gryllus domesticus Linne. (=*Acheta domesticus* Linne.)
Holoclara sp.
Euconocephalus sp.

To assess the type of food preferred by the phytophagous Orthopterans, the techniques of Barneys and Chapman[2] have been followed and, for the carnivorous forms, animal parts recovered from the gut of the experimental animals were compared with the body parts of insects living in the same locality/area and the food type was thus confirmed. Ten replicates of the gut were analysed before conclusions were drawn.

Observations and Discussion

Observations on the gut contents of *Gryllotalpa africanus*, a confirmed pest of potato[3], indicated this to be a carnivorous form, as the gut contained a number of fragments of termites and forficulid body parts. This suggested that the animal changes its food and food habits depending on the type of food available. Further, the proventricular region of the foregut has a highly chitinised armature, suggesting the animal to be a carnivore. In the case of *Gryllus domesticus* (Gryllidae), known to be feeding on waste food (also known to feed on the wounds of unhygienic people), the analysis of the crop indicates that it is not only a carnivore but also a cannibal. The food fragments seen in the crop are fairly large bits of insect parts. This may be due to the absence of the cuticular armature in the oesophagus and in the upper portion



FIGS. A–E. Fig. A. *Euconocephalus* sp.—Longitudinal proventricular fold 10 × 8. Fig. B. *Holoclara* sp. Longitudinal proventricular fold 10 × 8. Fig. C. *Gryllotalpa africanus*—Longitudinal fold of the proventriculus 10 × 8. Fig. D. *G. africanus*—Median proventricular region enlarged 45 × 8. Fig. E. *Gryllus domesticus*—Longitudinal proventricular (=*Acheta domesticus*) fold 10 × 8.

of the crop where the food is made into finer pieces. In all Gryllids, the mandibles are well developed and highly chitinised. Hence the mandibles alone are used to cut the food into larger fragments, which get stored up in the crop. It was also observed that the food particles in the lower half of the proventriculus are smaller than those in the crop region, suggesting that the proventriculus is functionally a mastigatory or grinding organ. In carnivorous insects, the proventricular teeth are well developed and highly chitinised so as to process chitinised parts of the insect food. Hence, it is surmised that the degree of chitinisation of the proventricular teeth largely depends on the type of food. Though the same pattern of proventicular teeth is seen in some Tettigonids, chitinisation is much less, thereby showing that they are not fit to process the chitinised body parts of the insect food. The Tettigonids (*Holoclara* sp. and *Euconocephalus* sp.), Acridids and Pyrgomorphids studied[4,5], are all herbivorous. In Acridids and Pyrgomorphids, the entire gut has minute cuticular teeth, arranged in a particular pattern and the food particles collected from the gut are always long suggesting that the leaf is cut into longitudinal bits by the armature. The first two nymphal instars of Acridids fail to feed on grasses containing a high percentage of silica[4] although the grasses are the normal food of adults. This is due to the absence of chitinised armature in the oesophagus and crop. Occasionally, some Acridids are known to feed on their own ecdysed skin as well as on their own young ones. This cannibalistic behaviour of the insects might be due to the innate craving for animal food[6].

It is also debatable whether the pattern of arrangement of the armature of the gut is to be regarded as a mere structural adaptation of the gut to the type of food or as having a taxonomical bearing. It has already been established that it can be used as a taxonomic character in Acridids[5] and also in Gryllids and Tettigonids[7,8].

The condition of food in the crop indicates that the carnivores or omnivores generally possess well developed, highly chitinised, sclerotised appendages in the proventricular region which facilitate grinding in this region of the gut as seen in Gryllids and Blattids. In all these forms, the region above the proventriculus *viz.*, Zone I to Zone IV[5] is poorly developed. In leaf eating insects the Z I to Z IV (*l.c.*) are generally well formed, carrying a number of cuticular aramatures capable of handling large leaf fragments with a high percentage of silica. In all such cases, the proventriculus does not function as a grinding organ, but as suggested for *Eyprepocnemis alacris alacris* (Serville)[4], is regulatory in function. Though the structure of the proventriculus is similar to the one in Gryllids, the proventricular sclerotised appendages are not so chitinised and complex as in the latter, suggesting that they cannot process chitinised parts of insect food as Gryllids and Blattids; hence the Tettigonid (*l.c.*) can only be a herbivore.

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