Cell Size in Millipedes

THE idea of the constancy of cell size for a particular tissue in different individuals of an animal species has long held sway in zoological literature. This concept has frequently been extended to cover nearly related species[1]. I wish to thank Dr. J. R. Baker, of Oxford, for suggesting this investigation into a case which proved to be at variance with the generally accepted view.

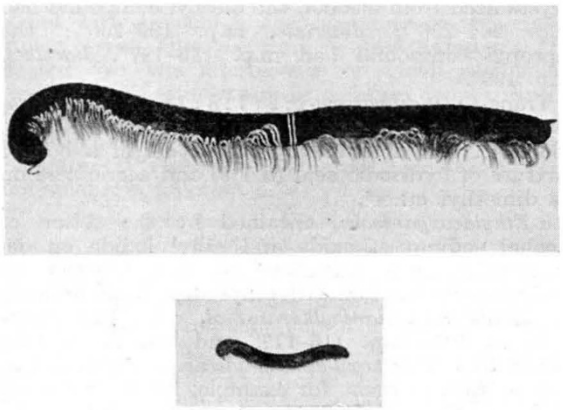

Fig. 1.

ABOVE, *Spirostreptus stenorhynchus*; BELOW, *Cylindroiulus londinensis*. BOTH ABOUT TWO THIRDS NATURAL SIZE.

Spirostreptus stenorhynchus is a very large millipede from Ceylon (Fig. 1). A specimen examined was 13·8 cm. long. The fore-gut (of stomodæal origin) of this animal was fixed in Flemming's fluid with reduced acetic acid content, and transverse sections cut at 5μ. Fat was removed from the sections by immersion in turpentine, and they were afterwards stained in iron hæmatoxylin. These sections were very kindly lent me by Dr. Baker. *Cylindroiulus londinensis*, a British millipede, of average length 2·7 cm., was treated in exactly the same way. It should be noted that these two animals are quite closely related species, both being formerly included in the genus *Iulus*. Flemming's fluid was used since it gives a reasonably good fixation of the nucleus without causing excessive shrinkage in the cytoplasm.

Fig. 2.

FORE-GUT CELLS OF *Spirostreptus* (ABOVE) AND *Cylindroiulus* (BELOW).

In the Ceylon millipede, fifty of the epithelial cells of the fore-gut (see Fig. 2) had an average length of 189 μ, and an average width of 7·8 μ. Corresponding dimensions of the cells of the British millipede were 54 μ and 3·9 μ respectively. It will therefore be seen that the cells of the Ceylon millipede are about fourteen times as large by volume as those of the British millipede. This really enormous difference in cell size (not, however, comparable with the difference in body volume) may perhaps be typical of single-layered epithelia, where symmetry relations according to the size of the lumen would demand larger cells in the larger species.

It may be pointed out, moreover, that W. F. Abercrombie[2] and W. Trager[3], working independently on the larva of the flesh-fly, *Lucilia sericata*, found that the entire growth of the larva from the first instar "is accounted for by increase in size of cells".

The photographs were taken at the John Innes Horticultural Institute by kind permission of Sir Daniel Hall.

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[1] See Painter, T. S., *J. Exp. Zoo.*, **50** (1928); also Berrill, N. J. *Phil. Trans.*, B, **225** (1935).
[2] *J. Morph.*, **59** (1936).
[3] *J. Exp. Zoo.*, **71** (1935).

Œstrogenic Activity of Certain Synthetic Compounds

IN earlier communications[1,2] two of us have described the œstrogenic activity of certain derivatives of diphenylethane, and in particular it was shown that the introduction of an ethylene linkage between the α and β carbon-atoms of such compounds greatly increased the potency. A number of stilbene derivatives were found to possess a marked activity. Following up this observation, the activity of *p*-hydroxypropylbenzene was next investigated and compared with that of *p*-hydroxypropenylbenzene (anol). The œstrogenic activity of some specimens of anol was found to be of a very high order, but further research indicated that this remarkable potency was probably due to the presence of a more complex substance produced as a by-product during the demethylation of anethole[3]. Recently, the activity of di-anol has been described[4].

In the meantime an investigation had been initiated at Oxford, the object of which was to prepare possible œstrogenic agents bearing a close structural resemblance to œstrone (or œstradiol) but which should be capable of ready synthesis.

Substance		Dose (mgm.)	Per cent Positive
4-Hydroxy acetophenone		100	Nil
4-Hydroxy propiophenone		10	100
4-Hydroxy butyrophenone		100	100
4 : 4′ : α : β-Tetra hydroxy-α : β-dimethyl-diphenyl ethane		100	100
4 : 4′ : α : β-Tetra hydroxy-α : β-diethyl-diphenyl ethane		0·1	100
		0·01	80
4 : 4′ : α : β-Tetra hydroxy-α : β-di-*n*-propyl diphenyl ethane		10	100
4 : 4′-Dihydroxy-α : β-diethyl diphenyl ethane		10	100
Trans-4 : 10-dihydroxy-1 : 2 : 7 : 8 : 13 : 14 :-hexahydro chrysene		1	100
4 : 4′ Dihydroxy-α : β-diethyl stilbene	in sesame oil	0·0005	100
		0·0004	100
		0·00035	60
	in water	0·0005	100
		0·0003	80
	in oil, orally	0·001	80
Diacetate of	in oil	0·001	100

In certain directions, especially in the diphenylethane and stilbene groups, we found it convenient to join forces in order to avoid duplication of work.