irregular tetrad is diagnosed as such only if more than the expected number of segregants ferment simultaneously (usually within eighteen hours), or if greater than the expected number of segregants do not ferment over an extended period of time.

To test the validity of the conversion theory, genetically stable, standard *g* and *me* clones were mated to *G* and *ME* clones from a converting pedigree. Tetrads derived from this mating were characterized for fermentative and vitamin-synthesizing abilities and mating-type specificities. A sufficient number of marker genes was used to establish hybridity beyond any question. The abilities of the haploid progeny from these hybrid asci to ferment galactose and melibiose were tested at two growth-periods: (1) after the segregant had achieved luxuriant growth on glucose agar; and (2) shortly after the spore had been isolated from the ascus when the cell population was still very small.

These analyses[5] revealed consistent correlations between phenotypes of the same segregant at the two growth-phases, and confirmed the initially *G* and *ME* genotypes of the extra-fermenters in non-Mendelian tetrads. They exclude the possibility that the latter result from chance mutation of originally *g* and *me* spores, and suggest that irregular segregations of fermentative abilities may originate in the heterozygote. Additional data have shown that polysomy and polyploidy are inadequate as explanations of the irregular segregations encountered.

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Photoperiodism and Diapause in Insects

DURING the past five years, work has been in progress at Rothamsted on rearing in the laboratory a number of plant-feeding insects. One of the aims has been to maintain supplies of insects in large numbers throughout the year. This has necessitated a study of the factors affecting diapause, the quiescent phase in which most plant-feeding insect species spend late autumn, winter and early spring.

Diapause has been studied in several insect species, but most attention has been paid to the tomato moth, *Diataraxia oleracea* L. This insect hibernates as a pupa and, as shown by Lloyd[1], a high percentage of pupæ in diapause is produced from larvæ reared in a glasshouse in spring and autumn, while around midsummer the pupæ produced are practically all non-diapause. Recently Speyer and Parr[2] showed that this occurred irrespective of temperature within the limits of 54–83° F., and concluded that diapause was induced by an innate factor and was not dependent upon environmental conditions.

Some three years ago, one of us (M. J. W.) found that if day-length during the larval period was increased to 16 hours a day by the use of artificial light (100-W. tungsten or 60-W. tubular fluorescent lamp) the number of pupæ in diapause produced in the winter months was reduced to 10–20 per cent. As a result, we have been able to rear some twenty-four generations of the tomato moth in the last three years.

An examination of the literature has shown no previous references to the effects of photoperiodism on insect diapause, and this factor is now being studied in further detail.

Batches of 40–50 tomato moth larvæ were reared in a constant temperature room at 75° F. under conditions of 24, 16, 8, 4 and 0 hours artificial light (60-W. tungsten lamp) per 24 hours and the percentages of pupæ in diapause determined in each treatment. These were as follow:

24 hr.	16 hr.	8 hr.	4 hr.	0 hr.
2	27	100	100	94 per cent

Further studies are at present in progress to determine the effects of light intensity, and the relationship, if any, between temperature and duration of light. It is possible that duration of light affects extent of feeding and that this in turn affects diapause. This and other factors will be studied.

Preliminary observations have shown that diapause in the large cabbage butterfly, *Pieris brassicæ*, and the cabbage moth, *Mamestra brassicæ*, may be prevented by artificial production of long days in winter, though in the latter species diapause has always occurred after three continuous generations, irrespective of length of day. Light has some effect on diapause in the mustard beetle, *Phædon cochleariæ*, but present observations suggest that the photoperiodic effect is relatively unimportant compared with that of temperature.

Detailed results of the above observations will be published elsewhere.

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Growth and Sinus Glands in a Crab

Brown and Cunningham[1], Abramowitz[2], and Scudamore[3] clearly established the inhibitive influence of the sinus glands on the moulting of Crustacea. Removal of this gland in *Eriocheir sinensis* H. M. Edw. has enabled us to extend these observations, and show more clearly the influence of this gland on growth inhibition.

The intermoulting period of crabs of 4–6 cm. (diameter of carapace) is at least two or three times as long as those of 2–3 cm. crabs[4]. Table 1 shows that this difference between the two categories disappears if the sinus glands are removed.

Table 1

Date of removal	Interval between removal and moulting (days) 2–4 cm. carapace	4–6 cm. carapace	Water (t° C.)
March	41 $\sigma_m = 2 \cdot 9$ (5)*	—	12
April	38 $\sigma_m = 1 \cdot 0$ (16)	36·5 (2)*	13
May	29 $\sigma_m = 0 \cdot 9$ (10)	32 $\sigma_m = 1 \cdot 3$ (7)	15
June	22 $\sigma_m = 1 \cdot 5$ (11)	26·3 $\sigma_m = 0 \cdot 3$ (6)	16
July	17 $\sigma_m = 1 \cdot 5$ (11)	—	17
September	27 $\sigma_m = 1 \cdot 2$ (8)	23 $\sigma_m = 1 \cdot 4$ (7)	15

* The numbers in parentheses indicate the number of specimens used.