mosomes of 11 species[2-5,8,9,14] are on record (table). The present observations on *P. laevis*, i.e. 2n = 50 (n = 25) are quite in conformity with those of Teichmann[9]. However, during the present studies female heterogamety of the ZW type has been found to exist, whereas Teichmann[9] could not establish the sex mechanism in this species. Moreover, she has reported 2 types of chromosomes, i.e., metacentric and submetacentric, in the diploid garniture of this species, whereas during the present investigations its karyotype was found to consist of 3 types of chromosomes, i.e. metacentric, submetacentric and acrocentric. The chromosome architecture of *P. assamensis* cannot be compared with that of any other species as no cytologically known species of the family Porcellionidae (table) possesses this chromosome number. From the table it becomes evident that a large majority of species exhibit n = 25 which, therefore, can be taken as the 'modal haploid number' for the family Porcellionidae.

Sex-chromosomes. Though there is a good deal of discussion on the question of sex mechanisms in Isopoda, only a few workers[6-8,14,16] have dealt with its cytological demonstration in this group. Female heterogamety of the ZW_1W_2-type has been recorded in 5 species of the marine superspecies *Jaera marina*[6,7] belonging to the family Janiridae and of the ZW-type in another isopod, *P. rathkei*[14], belonging to the family Porcellionidae. During the present studies, the same type of sex mechanism, i.e., ZW-type, demonstrating female heterogamety, has been found to exist in the isopod *P. laevis*, belonging to the same family, Porcellionidae. On the other hand, male heterogamety of the XO-type has been established in the isopod, *Tecticeps japonicus*[8] (family Sphaeromatidae), whereas the same of the XX-type has been demonstrated in the isopod, *Armadillidium nasatum*[16]. Thus, it is seen that heterogamety both in the male and female has been reported in a few of the cytologically worked out species of isopods, while most of the forms studied do not show any evidence of sex-chromosomes. It seems that morphologically differentiable sex-chromosomes have not evolved to a considerable extent in the isopods.

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A spontaneous tandem duplication in a *Drosophila* chromosome[1]

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Summary. A unique long tandem duplication was discovered in salivary gland chromosome arm 3L of *Drosophila kikkawai*. It occurred spontaneously under laboratory conditions.

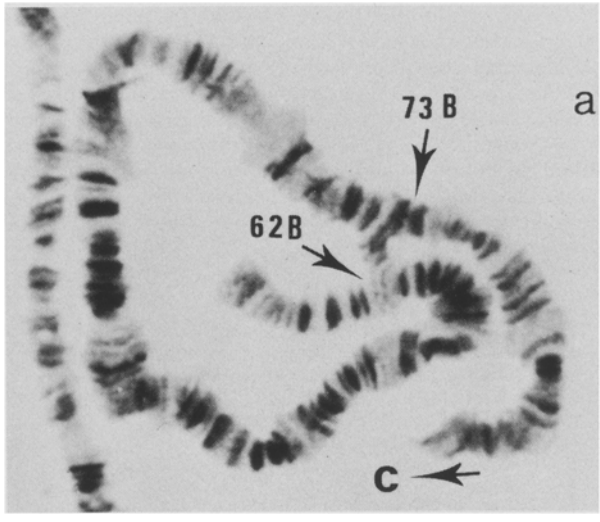
We report here the case of a long tandem duplication which occurred spontaneously. It was discovered in a larval female of *Drosophila kikkawai* during salivary gland chromosome analysis for gene arrangements.

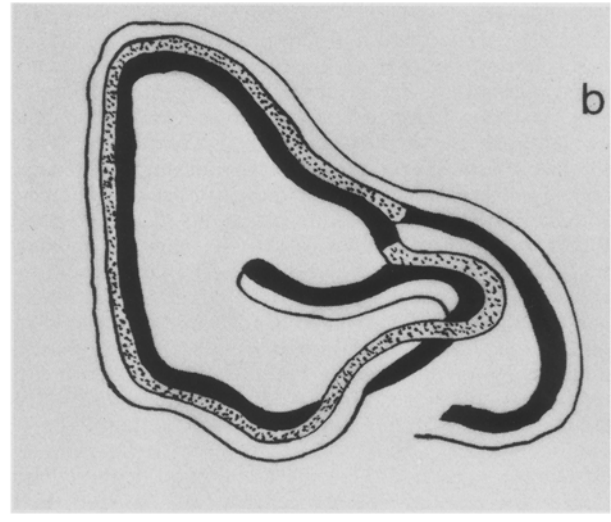
Materials and methods. A culture stock of *D. kikkawai* has recently been established from a wild-caught female collected from Tananarive, Madagascar (stock No. J9) by Dr O. Kitagawa. It has been maintained in the laboratory at 25 ± 1 °C. A male of this stock was allowed to mate, in a vial of normal medium, with a virgin female of standard stock from Samut Songkhram, Thailand. Salivary gland chromosomes were prepared from 3rd stage larvae using standard aceto-orcein squash preparation[2].

Results and discussion. A total of 30 F_1 larvae were routinely examined and scored for gene arrangements in comparison with the standard gene sequence[2,3]. All the chromosome arms showed standard gene order. Surprisingly, 1 of the larvae manifested, in heterozygous condition, the long tandem duplication in chromosome arm 3L, which is the subject of this note. The repeated segment was remarkably long, involving about 62% of the chromosome length. The 2 break points were at 62B and 73B (figure, a). It may be noted that the region of duplicated segments was completely synapsed, in general (figure, b). However, an asynapsed triplo was occasionally observed in some cells.

The origin of this unusually long tandem duplication may be attributed to unequal crossing-over of the non-sister chromatids. The duplicated chromosome survived during the meiotic process while the chromosome with deficiency for a long segment was probably lost due to the expected severe lethal effect. However, a chromosome with such a long repeated segment is not expected to be retained in the population, because of strongly unfavorable selection. Therefore, it is difficult to envisage that it arose in the wild population. It seems more likely that such event took place spontaneously in the laboratory population. Moreover, there is no evidence indicating that the tandem duplication has ever been established in our laboratory population despite a search which was carefully made ever since it was first detected.

A tandem duplication involving a short portion of a chromosome is not an uncommon event in various organisms[4]. The first case of a naturally occurring tandem duplication associated with the bar eye phenotype was discovered in *D. melanogaster*[5]. Generally, the effects of duplication of a small region of a chromosome are not lethal. In fact, duplication appears to be much less deleterious than a deficiency. Nevertheless, a more severe phenotypic effect could result if the portion of duplication is so large that it approaches a condition similar to trisomy. Unfortunately, phenotypic effects of this long tandem duplication are not certain since it has been detected only once in a larva.





a A photograph of polytene chromosome configuration of a heterozygote for chromosome arm 3L of *D. kikkawai* shows a long segment of tandem duplication. The limits of the 2 break points are clearly visible. Centromeric end (C) is indicated by an arrow. Photograph was taken on Kodak Panatomic-X film with green filter. ×200. *b* A diagrammatic representation of the pairing figure of the triplo. White and black lines represent standard sequence; shaded line is the repeated segment.

There is evidence suggesting that a tandem duplication tends to reduce recombination along the chromosome length[6-8]. On the other hand, there are some suggestions that duplication appears to facilitate chromosome pairing and thus promotes crossing over in the neighbourhood of the repeated segment[9].

A spontaneous tandem duplication involving a considerably long segment of a chromosome is extremely rare. Indeed, such an aberration has been detected only once in several hundred flies from the wild and from the culture stocks in this study. Hence, this observation may serve as an example of this rare phenomenon in eukaryotes.

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What determines the population size of the intracellular algal symbionts in the digestive cells of green hydra?[1]

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Summary. The ratios of algal volume to amount of host protein in 5 strains of green hydra were found to be closely similar. However, the components of algal volume varied in the 5 strains, suggesting differences in interactions between animal and algal growth rates.

Algal-invertebrate symbioses exhibit a dynamic equilibrium between numbers of symbionts and amount of available host tissue[2-4]. Perpetuation of a symbiosis depends on maintenance of this balance, for if growth rates of the partners were not identical, one would outgrow the other[5]. The freshwater coelenterate green hydra maintains a population of *Chlorella* algae within its digestive cells. In normal culture conditions, the growth rates of the algae and the animal host are identical, and numbers of algae per digestive cell remain constant[6-8], suggesting that there is some active process whereby stability between the components of the symbiosis is achieved. McAuley[9] has shown that the animal digestive cells control the division of the algae which they contain, but the problem remains of what factors determine the size to which the host permits the symbiont population to grow. In this study, investigations were made to see if variations in algal populations in 5 strains of green hydra could be correlated with a particular quantitative characteristic of the host.

Materials and methods. 3 strains of green hydra (Frome, Jubilee and Coronation) were isolated from the River Frome, Bristol, England, in 1976, 1977 and 1978 respectively. 2 further strains, Florida and European, were kindly supplied by Dr L. Muscatine (University of California, Los Angeles). The European strain was originally isolated in 1966 from a pond near Reading, England; the Florida strain was isolated in Florida, USA. Cultures of hydra were grown in small dishes containing 'M' solution[10], but minus Tris buffer, at 15 °C with 12 h light/12 h dark photoperiod and a light intensity of 1200 lx, in a Gallenkamp illuminated incubator. Hydra were fed on Monday, Wednesday and Friday on freshly hatched nauplii of *Artemia salina*[11].