investigations.

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MATING, OVIPOSITION AND EMERGENCE OF *DIADEGMA TRICHOPTILUS* (CAMERON) (HYMENOPTERA:ICHNEUMONIDAE), A LARVAL PARASITOID OF *EXELASTIS ATOMOSA* FAB.

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THE behavioural changes of hymenopterous parasitoids during some of the life processes such as mating, oviposition and emergence of adults in the field and effects of long term laboratory rearing on the physiology and behaviour of these insects are of concern to many researchers. Considering the importance of behavioural studies in biological control programme, the mating, oviposition and adult emergence of *Diadegma trichoptilus* were carried out. In the past several workers[1,4] attempted such studies.

Cultures of host and parasitoid were maintained at the laboratory conditions (22 ± 1°C, 55%—60%, R. H.). Newly emerged males and females were kept in special rectangular containers in 20 pairs for observations of mating behaviour. Simultaneously the food preference activity of both the sexes before and after mating was also noted. Oviposition behaviour was studied by providing 30 host larvae of known age (2-3 days) to freshly mated females in an oviposition unit and parasitized hosts were kept in petridishes to study the phenomenon of emergence of adults from their cocoons.

Adults started mating soon after their emergence. There is no precopulation period. The male, when excited by the presence of female, walked towards her tanning the wings, when the female was at a distance of 2.5 to 5 cm and the male raised its antennae, vibrated speedily in the air and spread the wings for a moment. With the help of legs, the male grasped the female and suddenly vibration of wings stopped after insertion of the aedeagus into bursa copulatrix. The female ramained stationary and indicated her receptivity. Both remained in copula for 2 to 3.3 min. The male can copulate twice a day but the female did not respond during the second time. Both sexes were attracted towards food after copulation. Almost immediately after thrusting the ovipositor, the female actively searched the suitable host larvae by taping its antennae to determine the suitability. If the female came across an unsuitable host, searching for a suitable one was continued. Oviposition lasted for 2 sec. Parasitized hosts were not accepted by females for oviposition. Shortly after copulation females begin to oviposit.

The adult parasitoid came out from the cocoon by cutting its anterior inner side with the help of its mandibles. During this phenomenon, the adult slowly ruputured the inner side of the cocoon till sufficient way was made for the emergence. This process was completed in 20-25 min. The parasitoid dragged the head first from the cocoon, freed the wings and antennae from body after emergence and later started short flights.

In *Bathyplectes curculionis* (Thom.) preoviposition period lasted for 30–40 min. contact during this period did not result in mating and later only the male exhibited courtship behaviour in the form of mating dance[1]. Qudenau and Guevrement noted a precopulation period of 45 hr in *Priopoda nigricollis* (Thom.) and copulation was observed in female ranging in age from 1 to 4 days. Parasitoid studied in the present communication had 2 to 2.3 minutes copulation period. In *Campoletis sonorensis* (Cameron), four successive phages *viz.*, antennal examination of larvae, ovipositor thrusting, ovipositor insertion and actual oviposition were completed in 1-8 seconds[3]. Simillar behaviour was found in *D. trichoptilus* but required only 2 seconds. In *Neodiprion sertifer* (Geoff) mating occurred between 9 a.m. to 8 p.m. and it was most intense between 12 noon to 5 p.m. with copulation period 9.2 ± 0.20 minutes[4] Similar behaviour was not noted in *D. trichoptilus* but the mating was observed during day time.

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OCCURRENCE OF TRIPLOIDY AND PARTHENOGENESIS IN THE ALLOCREADIID TREMATODE, *ALLOCREADIUM FASCIATUSI* KAKAJI 1969

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IN the life cycle of digenetic trematodes, the egg producing adult generation lives in the vertebrates and the larval generation occurs in the tissues of molluscan intermediate host. The adult usually reproduces by amphimixis which involves fusion of gametes formed by the meiotic activity of germ cells. The larval stages within the intermediate host on the other hand reproduce by asexual methods. In recent years, evidence has been presented to show that at least some adult digenetic trematodes reproduce by parthenogenesis which is coupled with the occurrence of triploidy[1-3]. Such instances are, however, rare.

In the course of our studies on cytogenetics of digenetic trematodes, it has been found that the allocreadiid trematode *Allocreadium fasciatusi* Kakaji 1969 which occurs in the intestine of the freshwater fish *Aplocheilus melastigma* McClelland in a stream at Waltair reproduces by parthenogenesis. Examination of sections of this fluke stained with haematoxylin and of smears and squashes of testes and eggs stained with acetoorcein and Feulgen methods[4] revealed that the mitotic figures unequivocally contain 21 chromosomes which could be arranged into 3 sets of 7 basic chromosomes indicating the triploid nature of the configuration (figure 1). No spermatozoa were found inside seminal vesicle or seminal receptacle or testes. Normal development of germ cells inside testes proceeded up to the formation of primary spermatocytes. Inside the primary spermatocytes there was no meiotic activity, the chromosomes were asynaptic and

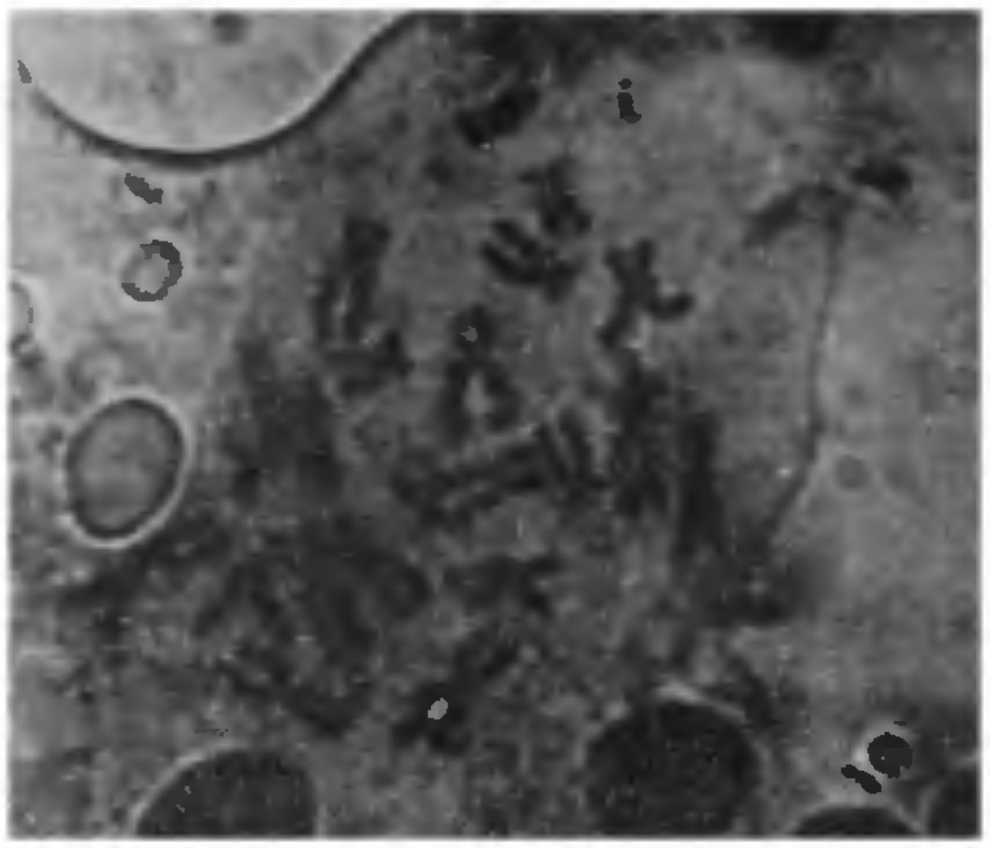

Figure 1. Mitotic metaphase plate of *A. faciatusi.*, showing 21 chromosomes.

appeared as mitotic univalents. Only a few primary spermatocytes successfully completed the division and developed into secondary spermatocytes. Further, very few spermatids, if at all, were found in testes smears and spermateleosis was a failure. In the oocytes enclosed inside the eggs, the development of oocyte proceeded without the intervention of a spermatozoon. There was only one maturation division in the primary oocyte which is of mitotic type and resulted in the release of a single polar body. Cleavage followed this division. All the evidence points to the fact that *A. fasciatusi* is a triploid species and reproduces by apomictic parthenogenesis.

Among digenetic trematodes, parthenogenesis coupled with triploidy has previously been reported in *Bunodera sacculata* van Cleave and Muller, 1934, *Paragonimus pulmonalis* (Baelz 1880) and *Fasciola* sp.[1-3] Occurrence of polyploidy and parthenogensis has also been noted in the caryophyllidean cestodes *Atractolytocestus huronensis* Anthony 1958 and *Gladacris catostomi* Cooper, 1920[5,6] and in the pseudophyllidean cestode *Diphyllobothrium erinacei* Faust, Campbell and Kellogg 1929[7]. Many other worms still remain to be explored for the possible occurrence of polyploidy and parthenogenesis. It seems reasonable to infer that polyploidy has played an important role in the evolution of hermaphroditic flatworms. In the light of this, the views of earlier authors[8-10] that there is no evidence of polyploidy within the group Digenea and that variations in chromosome numbers have occurred due to gradual addition or loss of chromosomes need to be modified.

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