FIRST INTERNATIONAL SYMPOSIUM ON INVERTEBRATE REPRODUCTION

RITA G. ADIYODI

Department of Zoology, Calicut University, Kerala 673 635

THE vast majority of animals in the world are invertebrates, but paradoxically enough, most studies on reproductive physiology deal with vertebrates. Reproduction of vertebrates is receiving greater attention probably because of the closer affinity of man to vertebrates, and also because most of his domesticated livestock are vertebrates. Invertebrates have an equally strong case inasmuch as they exhibit a wide variety of reproductive patterns and behaviour and there are many species among invertebrates that are useful or harmful to mankind. The International Symposium on Reproductive Physiology of Invertebrates (ISRPI) held at Calicut from September 10 to 12, 1975 under the joint auspices of the University of Calicut and the Kerala Academy of Biology considered the various aspects of the physiology of sex and reproduction in a variety of invertebrate groups. Of the 66 contributions from 14 countries, 38 were presented on the floor. ISRPI was inaugurated in the Library Hall of Calicut University by Prof. Sukumar Azhikode, Acting Vice-Chancellor of the University. N. B. Nair, president of the Kerala Academy of Biology, who presided over the function stressed the importance of studies on reproduction of marine invertebrates.

K. G. Adiyodi, convener of ISRPI in his welcome address, "New perspectives and challenges", pointed out the need for studies on the reproductive physiology of lowly organised invertebrates. These investigations could prove valuable in tracing the physiological phylogeny of reproduction, and also the relation between somatic growth and asexual and sexual types of reproduction. There is great need to look for extraovarian origin of yolk in invertebrates (that oviposit frequently or lay eggs in large numbers) other than insects and crustaceans. The site of synthesis of vitellogenins in crustaceans is also to be elucidated. Studies on the modes of action of invertebrate gonadotropins have suffered as no gonadotropin other than the insect juvenile hormone has been characterized todate. K. G. Adiyodi also suggested that the physiology and control of ovoviviparity and viviparity in invertebrates could make interesting comparisons with those of vertebrates.

There were eight scientific sessions (name of chairman in brackets): Sexual physiology and population dynamics (T. K. Watanabe, Japan), Spermatogenesis (W. H. Clark, Jr., USA), Sperm motility, egg cortical reaction and fertilization (Richard L. Miller, USA), Ovarian development and reproductive cycles (R. Nagabhushanam, India), Reproductive ecology and biochemistry (K. Hotta, Japan), Reproductive tracts and accessory sex glands (D. F. Went, Switzerland), Reproductive behaviour (B. R. Laurence, UK) and Mechanisms controlling reproduction (T. S. Adams, USA). Genetic variations and productivity in natural populations of *Drosophila melanogaster* were discussed by T. K. Watanabe (Japan). Katsunuma population has maintained for many years several polymorphic inversions; the heterokaryotype showed significant superiority with regard to productivity over both homokaryotypes. V. K. Bhasin and M. K. K. Pillai (India) suggested that mosquitoes can be more effectively sterilized by slower and sustained penetration of phosphoramides at low doses; in laboratory experiments, the sexual behaviour of male *Aedes aegypti* sterilized by phosphoramide treatment was not found altered. R. J. Irving-Bell's (Australia) studies on *Culex pipiens* complex indicate that cytoplasmic incompatibility may only occur between wild populations from climatically different environments rather than with geographical distance. Aspects of spermatogenesis studied by electron microscopy were presented by J. Pochon-Masson and I. D. G. Ginneken (France) and Y. Takahashi *et al.* (Japan). Richard L. Miller (USA) who reviewed the distribution of sperm chemotaxis in the animal kingdom said that circumstantial to strong evidence exists in Hydrozoa (Colenterata), Ectoprocta, Cephalopoda Mollusca, Chaetognatha, Urochordata and Vertebrata. Pericentriolar processes in cnidarian (*Hydractinia*) spermatids described by M. G. Kleve and W. H. Clark, Jr. (USA) are apparently not involved in the direct spermatogenic events; possibly they have some role in the chemotactic behaviour of the cnidarian sperm. R. W. Atherton (USA) in his contribution submitted to ISRPI hypothesized that "neurochemical effects on invertebrate and vertebrate sperm motility may be active through a path

linking acetylcholinesterase and adenylatecyclase activity".

Fertilizability can be induced in starfish oocytes by 1-methyladenine ; mixing of germinal vesicle material with ooplasm is, however, necessary for genuine cleavage. Nuclei of sperm that enter an oocyte having intact germinal vesicle show no visible change until the germinal vesicle is made to break with 1-methyladenine. Sperm nuclei now swell indicating the involvement of the material of the germinal vesicle in the process. W. H. Clark, Jr. *et al.* (USA) presented evidence to show that the cortical rods in the cortex of mature oocytes in penaeids are composed of neutral mucopolysaccharides, and suggested that their discharge and dissipation may depend on Mg^{++} ions, a protease and possibly a phosphatase. D. F. Went (Switzerland) narrated his success with *in vitro* culture from oogonium to larva for several generations in the paedogenetic viviparous gall midge, *Heteropeza pygmaea* ; determination of sex in the ovary depends on nutritive conditions for the feeding larvae.

The chemistry of sialoglycoproteins contained in the jelly coat substances of sea urchin eggs was presented by K. Hotta and M. Kurokawa (Japan) ; sialic acids in the sialoglycoprotein of *Pseudocentrotus depressus* consisted mainly of N-glycolyl- and N-aceto-glycolyl-4-methyl-4, 9-dideoxy neuraminic acids, whereas those of *Anthocidaris crassispina* and *Hemicentrotus pulcherrimus* were mostly N-glycolylneuraminic acid with some N-acetylyneuraminic acid. G. Anilkumar and K. G. Adiyodi (India) reported cyclicity in the secretory activity of the spermathecal glandular epithelium in the crab, *Paratelphusa hydrodromous* in relation to the vitellogenic cycle. This suggests that the spermathecal epithelium in crabs may be a target tissue of one or more of the crustacean reproductive hormones. T. S. Dhadialla (Kenya) presented the results of his investigations on the relative influences of mechanical and chemical factors of mating on engorgement in the female hard tick, *Rhipicephalus appendiculatus*. Results of Dhadialla seem to suggest that the stimuli for rapid engorgement in female ticks are mostly mechanical and partly chemical, the latter resulting from spermatophore and its contents.

Endocrine controls in ovarian maturation and the neural influences in oviposition received attention at ISRPI. T. S. Adams (USA) hypothesized that the oostatic hormone postulated by him in the housefly may regulate the release of neurosecretory material from the median neurosecretory cells. P. J. W. Olive (UK) presented evidence to show that prostomium is the source of a hormone that initiates and supports vitellogenesis in polychaetes. Spawning can be induced in gravid *Nephtys hombergi* if supra-oesophageal ganglion homogenate is administered ; the homogenate of sub-oesophageal ganglion shows no such effect. K. Yamaoka (Japan) explained his studies on mechanisms releasing ovipositional behaviour in *Bombyx mori*. Copulation enhances egg-laying and also the spontaneous nervous activity of the isolated last abdominal ganglion (SMG IX) in female moths. Oviposition-stimulating substance contained in male sex secretions transferred into the female during coitus apparently affects Na^+ and K^+ permeability of the sheath of SMG IX ; the change in ionic condition probably causes the activation of the ganglion.

The deliberations were interesting and useful and covered the structural, biochemical, histochemical, endocrinological, neurological, pharmacological, ecological, genetical and evolutionary aspects of reproductive function. An International Society for Invertebrate Reproduction (ISIR) was established at the Symposium. A 20-member executive council was elected with Wallis H. Clark, Jr. (USA) as the President, T. S. Adams (USA), B. R. Laurence (UK) and T. R. Odhiambo (Kenya) as the Vice-Presidents, K. G. Adiyodi (India) as the Secretary, P. J. W. Olive (UK) as the Joint Secretary and D. F. Went (Switzerland) as the Treasurer. Calicut symposium has been accepted as the First International Symposium on Invertebrate Reproduction of ISIR ; the second is slated to be held in USA in 1978.