

vegetarian diets and regardless of their composition, protects health.

Finally a topic on comparative nutrition of cats and dogs is included. The topic assumes importance in view of increasing pet food sales and manufacturing regulations by USDA, FAD, AAFCO and feed control officials.

As usual, too many areas concerned with nutrition are covered in these volumes and grouping the topics into subject categories appears necessary.

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**Reproductive Biology of Invertebrates, Vol. V, Sexual Reproduction and Behaviour.** Adiyodi, K. G. and Adiyodi, R. G. eds. Oxford & IBH Publishing Co. Pvt. Ltd., 66, Janpath, New Delhi 110 001. 1992. 511 pp. Rs. 450.

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Invertebrates are becoming increasingly important in respect of human disease control, pest management, food production and pharmaceuticals. This book, fifth in the multivolume series, *Reproductive Biology of Invertebrates*, is devoted to sexual differentiation and behaviour of the various invertebrate phyla. Considering the fact that many invertebrate phyla are little known both biologically and systematically, only a few major invertebrate groups such as arthropods and molluscs contain justifiably adequate information on this topic. Sex determination is, in general genetic, but the sexual differentiation is influenced by epigenetic factors like cytoplasmic, developmental and environmental, to mention a few. Under-

standably, a variety of sexual patterns is expected to occur in different phyla in view of their diversified habitats both in the aquatic and terrestrial environments. Similarly, sexual behaviour also involves several factors such as mate location, sex recognition, courtship, receptivity, mating and post-copulative behaviour. Endocrine regulation of sex differentiation and behaviour has also received attention only in the highly evolved invertebrate groups. The lowly organized invertebrate forms with tissular body organization (*Porifera*) is not expected to reveal such type of controlling mechanisms inasmuch as they do not possess any organized nervous or endocrine centres. Nevertheless, they show tremendous capacity in sexualization, at cellular level. In *Porifera*, the cell lineages leading to the formation of the gonocyte as influenced by developmental factors is an interesting example.

By far, malacostracan crustaceans have received maximum attention in respect of hormonal control of sexual differentiation. It is in this group, a male hormone producing androgenic gland has been discovered for the first time among invertebrates. Remarkable strides have also been made in providing experimental proofs for not only the male and female sex differentiation but also various types of hermaphroditic functioning. Further, the sexuality as well as the behavioural patterns related to sexual activities have great relevance to the controlled culture of certain invertebrate forms of economic importance. For instance, many marine invertebrate forms are known to produce natural product with far-reaching pharmaceutical importance as well as physiological functions, which are not known to exist in the animals that

produce them. Furthermore, in recent years, aquatic invertebrates such as rotifers are assuming greater importance as live feed organisms in the aquaculture of both finfish and shellfish. The selection and isolation of a suitable strain or phenotype require adequate information on the sexual biology and behaviour. In this context, some of the chapters especially dealing with not-very-well-known invertebrate forms is commendable and the information contained is useful not only to the researcher, but also to those who want to exploit them commercially.

The book, however, suffers setbacks in some respects. For example, the chapter on Chaetognatha deals mainly with maturation and the factors influencing the gamete formation. Information on either sex differentiation or sexual behaviour, instead, should have more justification concerning topicality of the book. Several authors used different terminologies to indicate a variety of sexual patterns, viz, gonochorism, mono- and bisexuality, as well as several parthenogenetic forms. This creates confusion to the general reader. Of course, the editors have tried to adopt uniformity by discarding the synonyms used in the earlier literature. It would have been highly rewarding if a glossary is given for the important terminologies used in the text. Despite these minor observations, in general, the book is quite good in scope and content and should provide interesting reading to all invertebrate biologists.

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