ABSTRACT

All the 3 genera of the family Longidoridae (Thorne, 1935)
Oxyl, 1961, viz., Longidorus (Micoletsky, 1922) Filipjev, 1934,
Xiphinema Cobb, 1913 and Paralongidorus Siddiqi et al., 1965
are known to occur in India, but it is Xiphinema which is quite
prevalent and was consequently selected for the present research
work. For the sake of convenience, the thesis has been divided in
3 parts. Part I provides an account of the morphology and
systematics of Xiphinema species. The validity of the groups/
subgenera proposed by Dalmasso (1969), Cohn & Sher (1972),
Southey (1973) and Roy & Gupta (1974) has been discussed and
the species of this genus have been re-arranged in 5 groups,
viz., americanum-group, elongatum-group, chambersi-group,
rotundatum-group, and radiocola-group. The descriptions of all
the species of Xiphinema so far recorded from India based on
the type material and/or fresh material collected from different
parts of this country (mainly from Uttar Pradesh, Himachal
Pradesh, Rajasthan, Jammu & Kashmir and Arunachal Pradesh)
during the last several years have been provided and their
distribution given. The description of each species is followed
by a detailed discussion on its relationships, geographical
distribution, economic importance etc. In all, the following 12
known species were recorded:

X. americanum Cobb, 1913
X. brevicolle Lordello & Da Costa, 1961
While *X. index* was previously doubtfully recorded from West Bengal (Mukhopadhyaya & Haque, 1974), *X. ensiculiferum* and *X. radioccola* are first records of monodelphic species from India. The males of *X. opisthohysterum* and *X. inaequale* having monochrochic and triorchic gonads respectively have been described for the first time. In addition to the already known species the following three new species of *Xiphinema* were also found during the course of the present investigations: *X. lambertii* n. sp., *X. neolongatum* n. sp. and *X. luci* n. sp. The new species are described in detail along with their diagnostic characters and relationships.

The synonymy of *X. australiae* Scieod & Chair, 1971 with *X. radioccola*, and *X. neocamericanum* Saxena et al., 1973 with *X. americanum* is proposed.

*X. insigne*, *X. americanum* and *X. basiri* are the widespread species in this country, while *X. ensiculiferum*, *X. arouw*
X. luci and X. neoeiargatum are very much restricted in their distribution. The other species are also fairly distributed.

Part II deals with the study of intraspecific variations of X. basiri and X. insigne, the two widely distributed species in this country which are also of common occurrence in Aligarh. The morphometric and allometric variations of adults and juveniles of a single local population of X. basiri (from the gardens of Botany Department, University campus, Aligarh) have been studied and the relationships of these variations among juvenile stages and adults have been worked out. These studies show that the odontostyle length and value of V are least variable characters in this species. Each character was found to vary to almost same extent in all the stages of life. A study of 23 populations of X. insigne from India shows extreme degree of variability within this species. These populations can be divided into two distinct morphological groups i) insigne-form, and ii) indicum-form. The adults and the juveniles of the two forms differ from each other in the shape of lip region, lengths of odontostyles, position of fixed guiding ring from the anterior extremity, tail lengths, values of c and c' ratios etc. Description is also provided of males of X. insigne (syn. X. indicum) newly reported from India. The anterior ovary of indicum-form though greatly reduced is occasionally functional.

The life history studies on X. basiri and X. insigne have been dealt in Part III. These studies include observations
on gametogenesis, embryogenesis and the juvenile stages. The population fluctuations of adults and juveniles of the two species have also been given. These studies show that while *X. basiri* reproduces twice a year, first in February-April and then in September-October, *X. insigne* reproduces only once in May-August. The males are extremely rare in both the species and although the testes are active throughout the year but they are perhaps incapable of impregnating the large number of females and as such the species propagate parthenogenetically. The effect of parthenogenetic mode of reproduction on intra-specific variations has also been discussed. The haploid chromosome number is 10 in the two species. In *X. basiri* both the ovaries are equally functional whereas in *X. insigne* frequency of egg production by the anterior ovary is much less (1:60) as compared to the posterior ovary. The two species take about a week for the completion of their embryonic development. Intra-uterine egg development in *X. insigne* has been reported for the first time in this genus. The duration of first stage juvenile ranges from a week to a maximum of 5 months. Second, third and fourth stage juveniles are present in the soil throughout the year and their duration may be quite long and variable.