FOLIA PARASITOLOGICA (PRAHA) 27: 117–121, 1980.

A CRITICAL STUDY OF THE SPECIES OF SPINOMETRA (TREMATODA: PLAGIORCHIIDAE)

M. AGARWAL

Department of Zoology, University of Lucknow, Lucknow

Abstract. The genus *Spinometra* Mehra, 1931 (Trematoda: Plagiorchiidae) with the type species *S. kachugae* Mehra, 1931 is redescribed from a large number of immature and mature flukes procured on four occasions from the intestine of fresh-water turtle *Kachuga kachuga*. The morphological characters utilized to distinguish the three other species so far described are found to vary within *S. kachugae*. It is, therefore, proposed that *S. gangetica* Mehra, 1937, *S. gigantica* Dwivedi, 1965 and *S. thapari* Agarwal, 1976 be considered synonyms of the type species *S. kachugae*.

Spinometra kachugae Mehra, 1931 was described from the intestine of fresh-water turtles. Subsequently, three other species *S. gangetica* Mehra, 1937, *S. gigantica* Dwivedi, 1965 and *S. thapari* Agarwal, 1976, have been described from freshwater chelonians of India. During the present study 21 freshwater turtles were examined from Kukrail, a tributary of the river Gomti, Lucknow, over a period of one year. Four hosts were found to be infected with flukes, which on examination revealed the characters of the genus *Spinometra*. The immature and mature flukes were studied alive, from whole stained preparations and from serial sections. All measurements are in micrometers, unless otherwise stated.

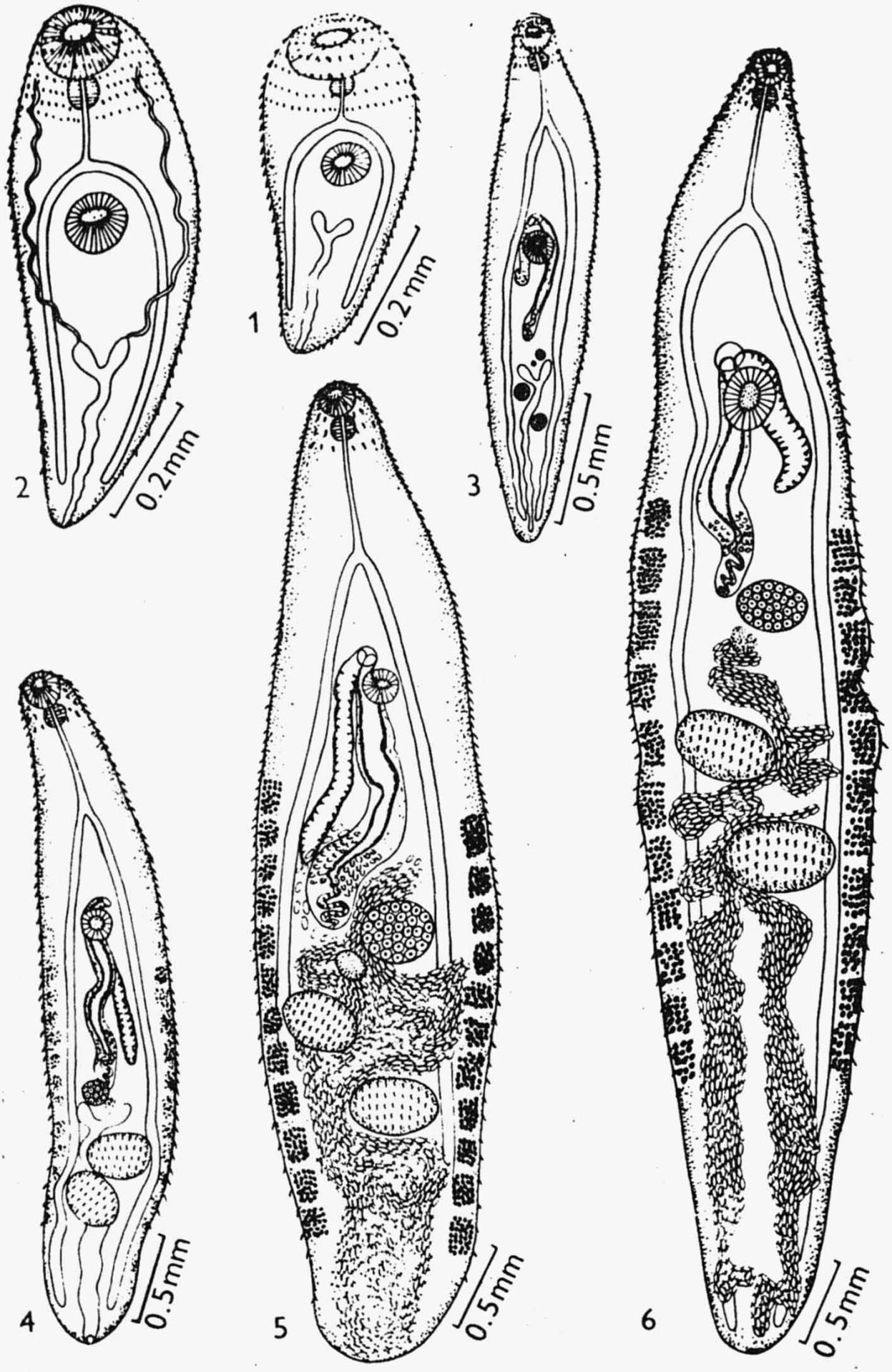
DESCRIPTION

Immature flukes (Fig. 1): Body pear-shaped and spiny, with large terminal oral sucker and post-bifurcal ventral sucker in anterior half. The ratio of oral sucker to ventral sucker being 2 : 1. Pharynx and oesophagus present; intestinal caeca terminate a small distance from distal end of body; genital anlagen not visible. Excretory bladder Y-shaped, with long stem and short arms, receiving collecting canals on either side. As the fluke grows, the ratio of oral sucker to ventral sucker reduces to 1.4 : 1 (Fig. 2).

With advanced growth the flukes (Fig. 3) become elongated and oral sucker further reduces in size. Ventral sucker shifts far beyond the intestinal bifurcation. Rudiments of testes lie on either side of excretory stem in posterior half of body; cirrus sac on one side of ventral sucker. Rudiment of ovary and seminal receptacle located just anterior to fork of Y; metraterm running parallel to cirrus sac, opening at common genital pore.

Gradually the testes become elongated, somewhat oblique, lying at close proximity to one another but separated by the excretory stem. Seminal receptacle becomes differentiated and extracaecal vitellaria develop (Fig. 4).

Mature fluke (Figs. 5, 6): Body elongated, with tapered anterior end and blunt posterior end. Scale-like spines arranged in numerous transverse rows in the region of oral sucker and pharynx, then becoming sparser in middle region and practically disappearing from posterior region. Length of body 5.80—8.25 mm, with a maximum width of 1.02—1.57 mm. Oral sucker 170—210; ventral sucker 210—530, the ratio being 1 : 1 to 1 : 2.4. Prepharynx absent; pharynx muscular, 100—140 × 90—100; oesophagus narrow and long, 320/472 in length, bifurcating far anterior to ventral sucker; intestinal caeca terminating at posterior end of body.



Spinometra kachugae Mehra, 1931. **Figs. 1—2.** Immature flukes, alive, dorsal and ventral views respectively. Figs. **3—4.** Juvenile flukes, permanent mounts, dorsal and ventral views respectively. **Figs 5—6.** Mature flukes, permanent mounths, dorsal views.

Testes oval, tandem or oblique, 280—530×370—610. Cirrus sac very large, elongated, spiny, highly muscular, somewhat curved, 1.0—1.65 mm long and 150—280 in maximum width, extending up to ovary. Cirrus sac encloses highly convoluted seminal vesicle, narrow muscular constricted long pars prostatica with broad lumen; numerous prostate glands and an ejaculatory duct opening at genital atrium (Fig. 7). Genital atrium preacetabular and may be slightly on left side (Fig. 6) or median (Fig. 5), close to ventral sucker.

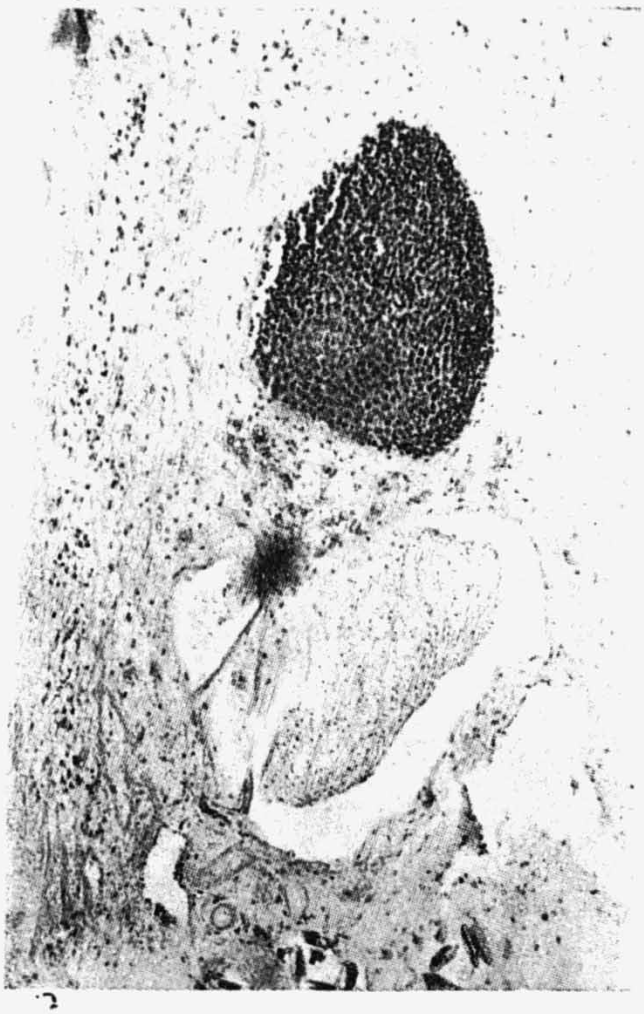


Fig. 7. Longitudinal section of *Spinometra kachugae* Mehra, 1931, showing cirrus sac, ovary, metraterm and ventral sucker (×45).

Fig. 8. Longitudinal section of *Spinometra kachugae* Mehra, 1931, showing ovary, uterine seminal receptacle, shell glands and uterus (× 105).

Ovary ovoid, 200—300 × 300—380, slightly submedian to right, pretesticular and posterior to cirrus sac. Uterine seminal receptacle posterior to ovary (Fig. 8). Vitellaria lateral, arranged in groups, extending from middle of cirrus sac up to some distance anterior to caecal ends. Uterus first descending, then ascending, distal end forming a long, crescent-shaped metraterm, having characteristic folded wall, 710—860 × × 180—200, and opens at the preacetabular genital atrium (Fig. 7). Eggs elliptical, measure 24—25 × 14—15. Excretory bladder Y—shaped, main stem reaching up to testes. Excretory pore terminal at posterior end.

DISCUSSION

To date, all the four species of the genus *Spinometra* have been described from fresh-water turtles of India. The characteristics used to distinguish them are: ratio of two suckers; absence or presence of prepharynx; size of oesophagus; position of gonads and genital pore; cirrus with or without scale-like spines; the size of metraterm and the body size.

The ratio of oral sucker to ventral sucker is 1 : 3 in *S. kachugae;* 1 : 2 in *S. gangetica;* and 1 : 1 in *S. thapari.* In the present studies, the ventral sucker is smaller than oral sucker in developing stages, but as the fluke grows, the size of ventral sucker increases and in mature specimens, the two suckers may be of equal size (Fig. 5), or larger than oral sucker (Fig. 6). Consequently, the ratio of the two suckers does not seem to be a decisive character.

The prepharynx is reported to be absent in *S. thapari* and also absent in the present specimens. In *S. kachugae* and *S. gigantica* the presence of prepharynx is reported in the text, although from the diagrams, it appears to be absent. The length of eosophagus changes with the growth of the fluke, and therefore, cannot be regarded as a distinguishing feature.

The position of gonads also is more or less the same in the four species. Agarwal (1976) stated in the text that the positions of gonads differ in *S. thapari*, but in the diagram they are similar to that of *S. kachugae*. The position of genital pore was found to vary in the present specimens from median to slightly left of ventral sucker (Figs. 5, 6). Thus the position of gonads or of genital pore could not be regarded as justifiable specific character.

The spines in the cirrus sac are reported in all the species except *S. thapari*, which may not have been visible due to a single damaged specimen examined by the author. In the present studies, the spines were not visible in some whole mounts, but they were clear in all serial sections. Thus validity of this character for specific separation as used by Agarwal (1976) is rather doubtful.

Regarding the size of various organs, it was observed that it varies with the body size, and during present studies, considerable variations were noted as already mentioned in the text, specially when large number of flukes are examined.

The above discussion clearly exhibits that the diagnostic characters utilized by the authors are overlapping and do not indicate distinct speciation. Perhaps there is only one species of *Spinometra* confined to fresh-water turtles, and the others fall within the natural range of variation exhibited by the type species. It is, therefore, proposed that *S. gangetica*, *S. gigantica* and *S. thapari* may be synonymised with *S. kachugae.*

Acknowledgements. I am grateful to Prof. G. Premvati for the guidance and encouragement throughout the course of my research. I extend my thanks to State Council of Science and Technology, Lucknow, U. P. for the financial assistance under the scheme No. SCST/2338/76-LKO (29)/74 sanctioned to Prof. Premvati. This work is part to Ph. D. thesis submitted at Lucknow University.

КРИТИЧЕСКОЕ ИЗУЧЕНИЕ ВИДОВ РОДА *SPINOMETRA* (TREMATODA: PLAGIORCHIIDAE)

М. Агарвал

Резюме. Дано переописание рода *Spinometra* Mehra, 1931 (Trematoda: Plagiorchiidae) с типичным видом *S. kachugae* Mehra, 1931 на основе большого числа неполовозрелых и половозрелых трематод, полученных из кишки пресноводной черепахи *Kachuga kachuga.* Обнаружено, что морфологические признаки, используемые для дифференциации других трех до сих пор описанных видов, совпадают в изменчивость вида *S. kachugae.* Поэтому предлогается рассматривать виды *S. gangetica* Mehra, 1937, *S. gigantica* Dwivedi, 1965 и *S. thapari* Agarwal, 1976 как синонимы типичного вида *S. kachugae.*

REFERENCES

AGARWAL N., On two new trematodes from *Kachuga kachuga* (Gray). Japanese J. Parasitol. 25: 424—426, 1976.

DWIVEDI M. P., On a new species of the genus *Spinometra* Mehra, 1931 (Plagiorchiidae: Astiotrematinae). Rev. Biol. Trop. 13: 91—99, 1965.

MEHRA H. R., A new genus (*Spinometra*) of the family Lepodermatidae Odhner (Trematoda) from a tortoise, with a systematic discussion and classification of the family. Parasitology 23: 157—178, 1931.

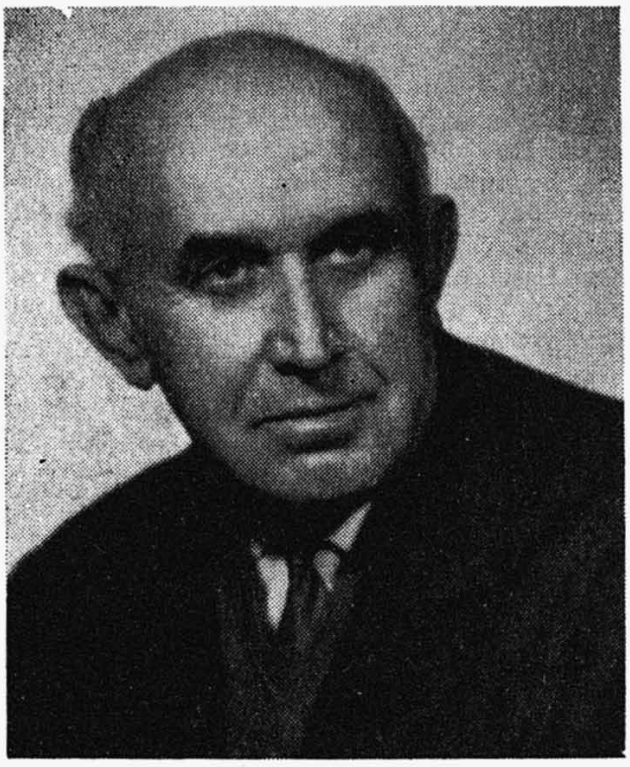
—, Certain new and already known distomes of the family Lepodermatidae Odhner (Trematoda) with a discussion on the classification of the family. Z. Parasitenk. 2: 429—469, 1937.

Received 24 April 1979.

M. A., Department of Zoology,
University of Lucknow, Lucknow (U. P.)
226 007, India

FOLIA PARASITOLOGICA (PRAHA) 27: 121—122, 1980.

Professor RNDr. Jaroslav Kramář, D.Sc. is seventy



11 April 1980 marks the 70th birthday of the leading Czechoslovak parasitologist, Professor RNDr. Jaroslav Kramář, D.Sc. He was born 11 April 1910 at Velké Hamry in the family of a weaver. He spent his childhood in his native Jizerské Mts. where his deep interest in natural sciences, mainly biology, began to form under the influence of the beautiful, then intact nature surrounding him. This interest led the young Kramář to attend the teacher's college in Jičín where he studied not only biology, but also chemistry, physics and mathematics included in the curriculum. This wide basis of knowledge proved a great help in his later studies and mainly in his work of developing new biological techniques. As a young teacher he was employed in Prague where he enrolled at the Faculty of Sciences, Charles University, studying natural history and geography in order to qualify as secondary school teacher. However, he had to interrupt his studies because all universities were closed by the Nazi occupants in 1939. He completed his studies after the liberation of Czechoslovakia and graduated in zoology with the degree of RNDr (approximate equivalent of Master of Science) in 1948. He became teaching assistant at the Zoology Institute of the Pedagogical Faculty, Charles University and in 1951 transferred to the Parasitology department of the Natural Faculty as assistant lecturer. In 1954 he qualified as Associate Professor, in 1957 received his Candidate of Sciences degree (equivalent to PhD), in 1963 was appointed Professor of parasitology and in 1966 presented his thesis for the award of Doctor of Sciences (D.Sc.) degree. From 1953 to 1976 he headed the Department of parasitology and hydrobiology, Faculty of Sciences, Charles University in Prague and retired in 1978. While at the Faculty of Sciences he also held other important positions such as the office of Vice-Dean of the Faculty.

The brief outline of his biography, however, cannot fully characterize the rich and active life of a personality such as Professor Kramář. He is primarily a teacher, who has served at all levels of Czechoslovak school system, from primary school to university. During his teacher's career he gained wide experience which made it possible for him to be always on best terms