

## Helminth parasites of the hedgehog, *Hemiechinus auritus* in Kuwait with description of two new nematodes *Seuratum kuwaitensis* and *Spirura auriti*

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### ABSTRACT

The nematodes *Seuratum kuwaitensis* n.sp. and *Spirura auriti* n.sp. and the cestode *Mathevotaenia skrjabini* are described and illustrated from specimens collected from the gut of the hedgehog, *Hemiechinus auritus* in Kuwait. *Seuratum kuwaitensis* from the intestine is close to *S. tacapense* but differs from it in the measurements of the various organs, the reduced number of longitudinal rows of cuticular spines in the male, the forked tips of the spicules, the triangular mouth opening and the presence of denticles on its rim as well as in the shape of the gubernaculum. *Spirura auriti* from the stomach is near to *S. rytipleurites* but differs from it in the structure of the cephalic region, the smaller size of the spicules, the proportional difference between the two spicules and the smaller size of the gubernaculum and eggs. The cestode *Mathevotaenia skrjabini* from the intestine is redescribed and reported from Kuwait for the first time.

### INTRODUCTION

Nine hedgehogs, *Hemiechinus auritus* Gmelin, 1770 were examined parasitologically in the State of Kuwait. Four were found to harbour helminth parasites, where two adult species of nematodes and one adult species of a cestode were recovered from the gut, and two species of immature spiruroid-type larval forms were found encysted in the mesenteries. The four hedgehogs were infected with a species of the nematode genus *Seuratum*; one infected in addition with a species of the nematode genus *Spirura* and one with a species of the cestode genus *Mathevotaenia*.

Some of the nematode specimens were cleared in lactic acid while others were stained in Horen's trichrome and cleared in lactophenol for examination. Some specimens were also mounted in Berlese fluid for measurement of chitinous structures. Specimens for scanning electron microscopy were dried using the critical point technique with carbon dioxide as drying medium and coated with gold. The cestodes were stained in alum carmine. Drawings were made with the help of a Leitz Dialux drawing tube.

The two adult nematode species recovered from the gut were found to represent new species and are here described. The cestode species is redescribed.

## NEMATODA

## Family SEURATIDAE

*Seuratum kuwaitensis*

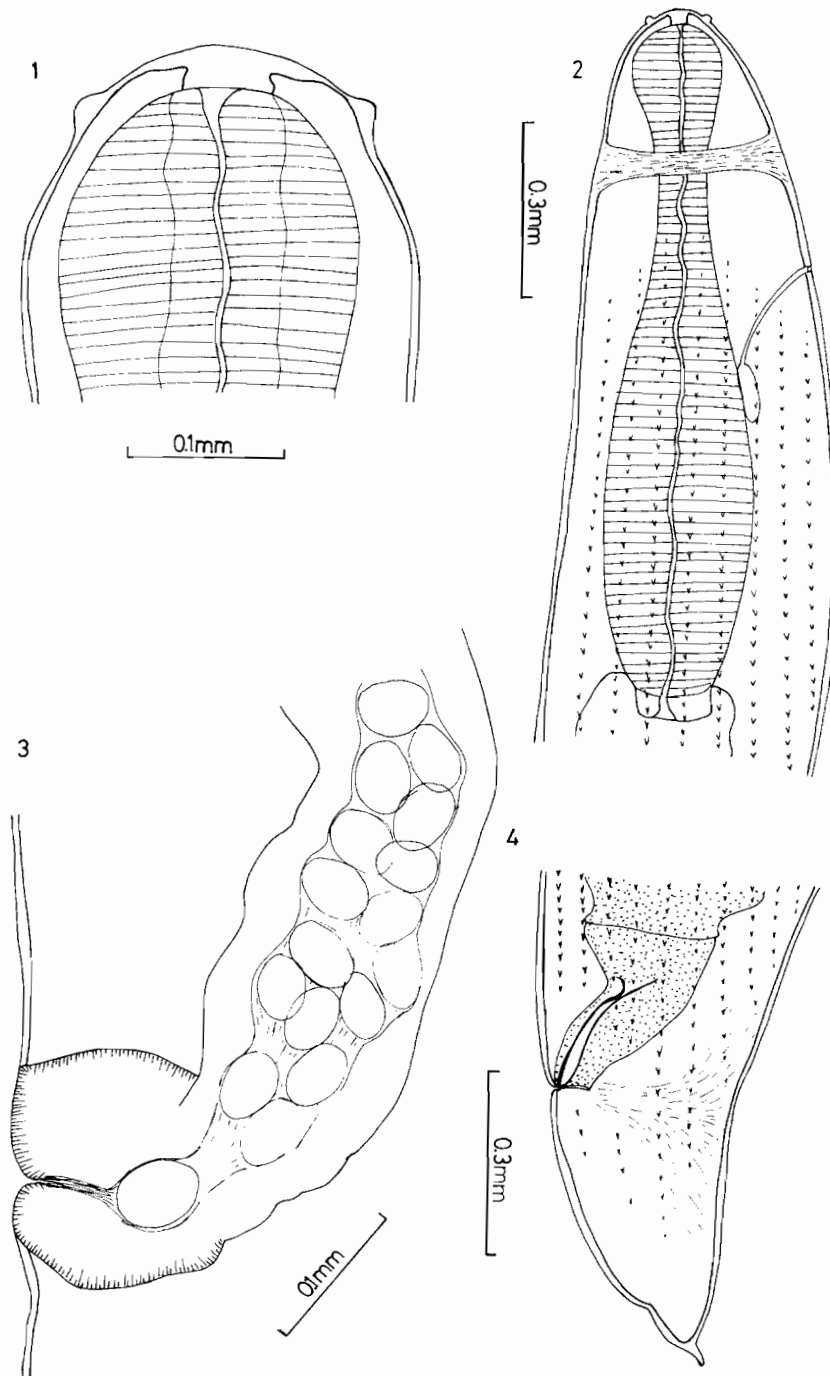
(Figs 1-8; Plate I, 1-6)

Cylindrical worms with a comparatively small length, pointed at both ends. The cuticle is thick and possesses conspicuous transverse striations. There are several longitudinal rows of cuticular spines directed backwards (Fig. 2; Plate I: 3, 4), their number is constant in the middle of the body of each sex but varies between males and females, and decreases near the anterior and posterior extremities of both sexes. Mouth opening triangular with round angles and its rim has very small denticles (Plate I: 1, 2). Around the mouth opening there is a slight elevation of the surrounding tissues but no distinct lips could be seen. No trace of internal labial papillae could be seen but there are four large oval cephalic papillae and two small amphids. The buccal cavity is shallow and the clavate muscular oesophagus has a slightly swollen anterior end. The cervical papillae could not be seen.

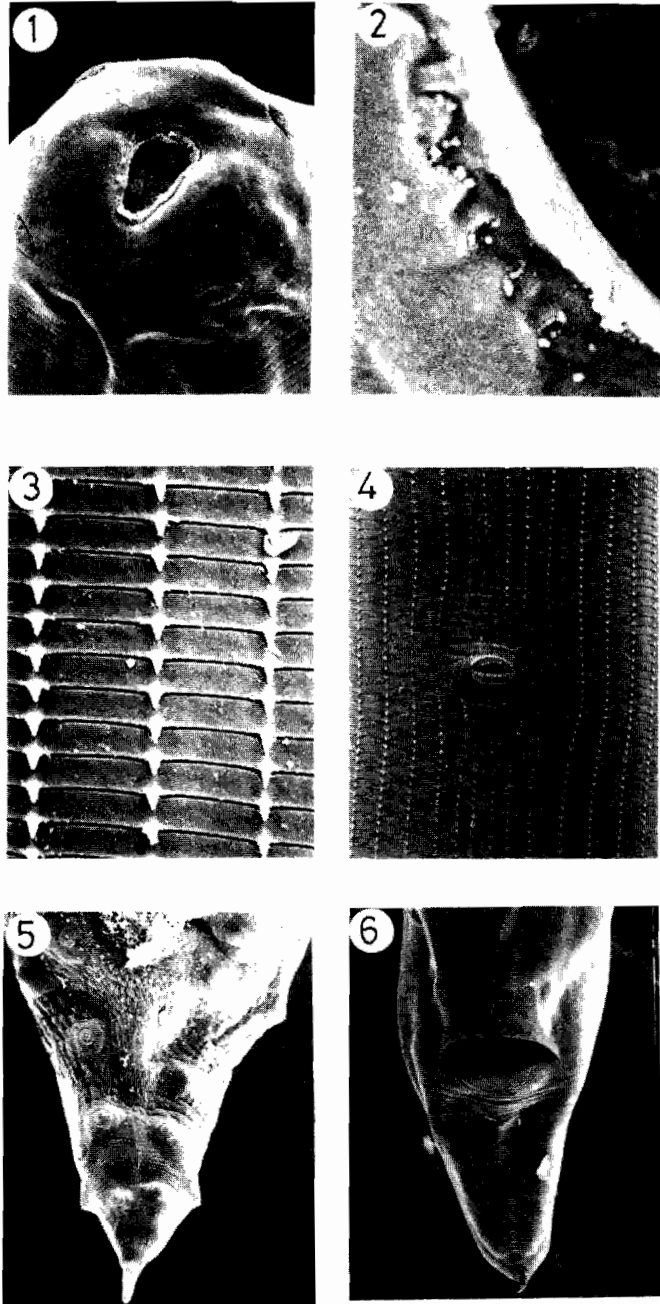
*Male:* More slender than female, measuring 14.0-15.4 mm in length and 0.43-0.49 mm in maximum width. There are fine transverse striations, starting just behind the head region, and these start to have longitudinal rows of posteriorly directed spines in the region of the excretory pore. The spines become more prominent as they proceed posteriorly. In the middle region of the body there are 54 longitudinal rows of spines and this number is constant in five-sectioned males. A short distance in front of the cloaca the spines become weaker and the number of rows reduced. In the precloacal region the longitudinal rows of spines disappear and the ventral region, anterior and posterior to the cloaca, becomes ornate with small tubercles (Figs 6, 7; Plate I: 5). On the lateral and dorsal sides of the cloacal region the transverse striations continue to near the tip of the tail.

The mouth leads into a shallow buccal cavity of 0.23-0.29 mm (Fig. 1), and the clavate oesophagus is 1.01-1.012 mm long (Fig. 2). The nerve ring and excretory pore are 0.22-0.24 and 0.33-0.42 mm from the anterior end respectively (Fig. 2). There are two equal spicules 0.166-0.191 mm long with forked pointed tips (Figs 7, 8). The delicate gubernaculum, 0.051-0.074 mm long, is formed of two parts, an anterior ring-like part attached to a short rod-like part (Figs 7, 8). There are 10 pairs of caudal papillae: 3 preanal, 2 adanal and 5 postanal (Figs 6, 7). The first and last pairs of postanal papillae are lateral in position and pedunculated. There is a very narrow caudal ala and the tail terminates with a short spike (Figs 7, 8; Plate I: 5). The length of the tail including the spike is 0.180-0.185 mm.

*Female:* Tapers gradually anteriorly and posteriorly, measuring 27.1-34.9 mm in length and 0.67-0.81 mm in maximum width attained near the middle of the body. The cuticle bears transverse striations and longitudinal rows of spines similar to the males. The number of longitudinal rows of spines in five females sectioned near the middle of the body is 64 per female. The spines are less prominent in the anterior and posterior regions of the body but the transverse striations extend just behind the head region to near the tip of the tail. The mouth leads into a shallow buccal cavity 0.042-0.046 mm deep and the oesophagus is 1.39-1.72 mm long. The nerve ring and



**Figs 1–4.** *Seuratium kuwaitensis* n.sp.  
**Fig. 1.** Anterior end, lateral view.  
**Fig. 2.** Oesophageal region of male, lateral view.  
**Fig. 3.** Vulvar region of female.  
**Fig. 4.** Tail region of female.



**PLATE I.** *Seuratium kuwaitensis* n.sp.

**Fig. 1.** Apical view of anterior end.

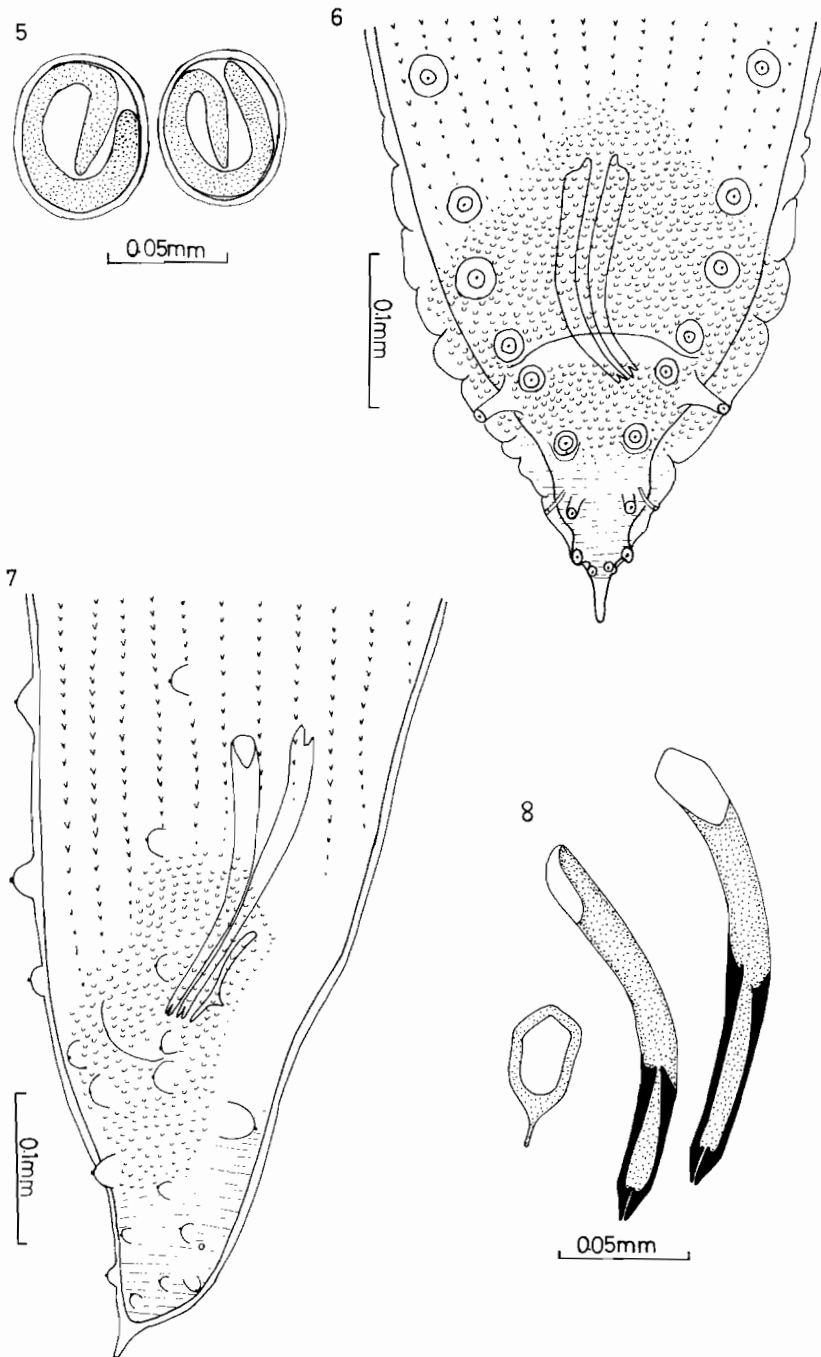
**Fig. 2.** Rim of the mouth opening showing denticles.

**Fig. 3.** Body cuticle of female showing cuticular striations and longitudinal rows of cuticular spines.

**Fig. 4.** Vulvar region of female.

**Fig. 5.** Posterior end of male, ventral view.

**Fig. 6.** Posterior end of female, ventral view.



**Figs 5–8.** *Seuratum kuwaitensis* n.sp.

**Fig. 5.** Eggs.

**Fig. 6.** Posterior end of male, ventral view.

**Fig. 7.** Posterior end of male, lateral view.

**Fig. 8.** Spicules and gubernaculum.

excretory pore are 0.26–0.32 and 0.37–0.46 mm from the anterior end respectively. The oval vulvar opening lies at 11.5–15.1 mm from the anterior end of the body (Plate I: 4). The position of the vulvar opening is marked by a slightly raised region where the longitudinal rows of spines are slightly interrupted. The pair of sessile papillae lateral to the vulvar opening reported in some species of the genus were not observed in the present specimens. The vagina is thick-walled and directed anteriorly (Fig. 3). The oval eggs measure 0.48–0.55 × 0.037–0.044 mm, have a smooth surface and are embryonated when laid (Fig. 5). The tail is conical terminating in a short spike and measures 0.35–0.51 mm in length (Fig. 4; Plate I: 6).

#### Discussion

The genus *Seuratum* was proposed by Hall (1916) with *S. tacapense* (= *Opiostomum tacapense* Seurat, 1915) as the type species. Since then five other species have been assigned to the genus, namely, *S. cadarachense* Desportes, 1947, *S. cancellatum* Chitwood, 1938, *S. congolense* Sandground, 1937, *S. mucronatum* Rudolphi, 1809, and *S. nguyenvanaii* Le Van Hoa, 1964. Biocca & Chabaud (1951) and Specian & Ubelaker (1976) gave a redescription of *S. mucronatum* and *S. cancellatum* respectively. The species of the genus have so far been reported from rodents, bats and shrews and differentiated by the number of longitudinal rows of spines, the presence or absence of a buccal cavity, denticles, papillae near the vulvar opening, caudal alae and measurements of the various organs.

The present specimens clearly belong to the genus *Seuratum* as they have a cuticle with fine transverse striations and longitudinal rows of spines and other characteristics of the genus. They are near to *S. tacapense*, the type species of the genus originally reported from *Ctenodactylus gundi*, a rodent in Tunisia. They differ from it in the smaller size of the body and the measurements of the various organs, the reduced number of longitudinal rows of spines of 54 in the male against 64 in *S. tacapense*, the forked tips of the spicule, the triangular mouth opening and the presence of denticles on the rim of the opening as well as in the shape of the gubernaculum. From all other species of the genus with the exception of *S. congolense* they differ in the absence of sessile papillae lateral to the vulvar opening and in the number of longitudinal rows of spines. From *S. congolense* reported from bats in Zaire it differs in the presence of denticles, the number of longitudinal rows of spines (16–20) and the general measurements of the body. For these reasons the present specimens represent a new species and this is the first record of the species of the genus from a hedgehog, which is an insectivore.

Parasite: *Seuratum kuwaitensis* n.sp.

Host: *Hemiechinus auritus*

Location: intestine

Locality: Kuwait

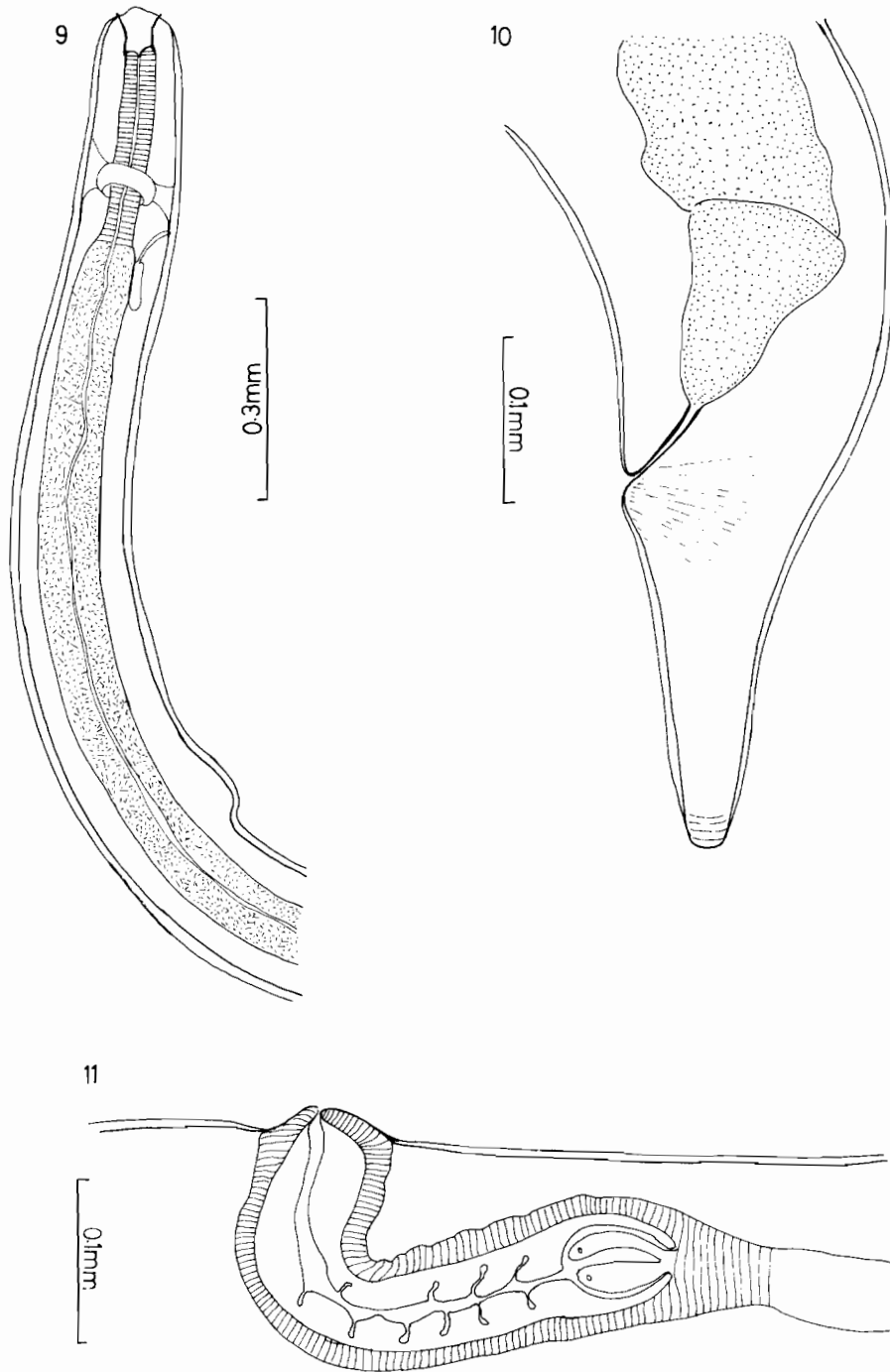
Type: the Helminth Collection of the Commonwealth Institute of Parasitology, No. B. 1038.

#### Family SPIRURIDAE

*Spirura auriti* n.sp.

(Figs 9–14; Plate II: 7–12)

The following description is based on the measurements taken from 10 adult males, 4 slightly immature females and several fragments of mature females.

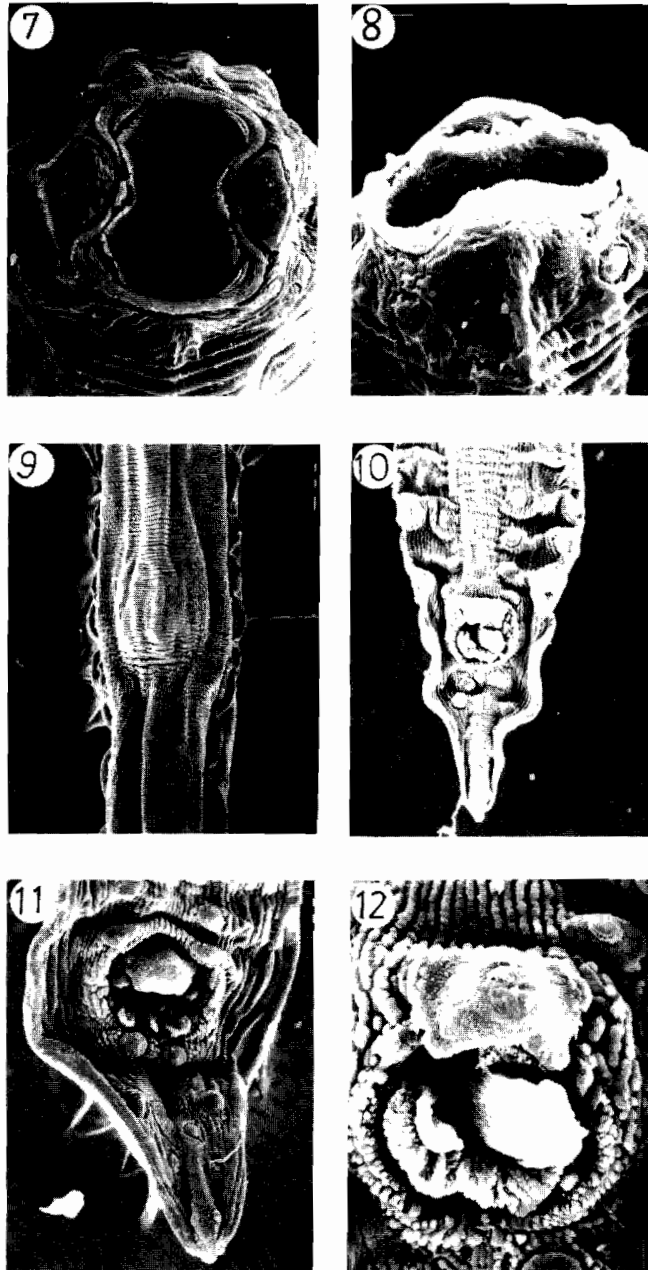


**Figs 9–11.** *Spirura auriti* n.sp.

**Fig. 9.** Anterior end of male, lateral view.

**Fig. 10.** Posterior end of female, lateral view.

**Fig. 11.** Vulvar region of female.



**PLATE II.** *Spirura auriti* n.sp.

**Fig. 7.** Apical view of anterior end of male.

**Fig. 8.** Lateral view of anterior end of male.

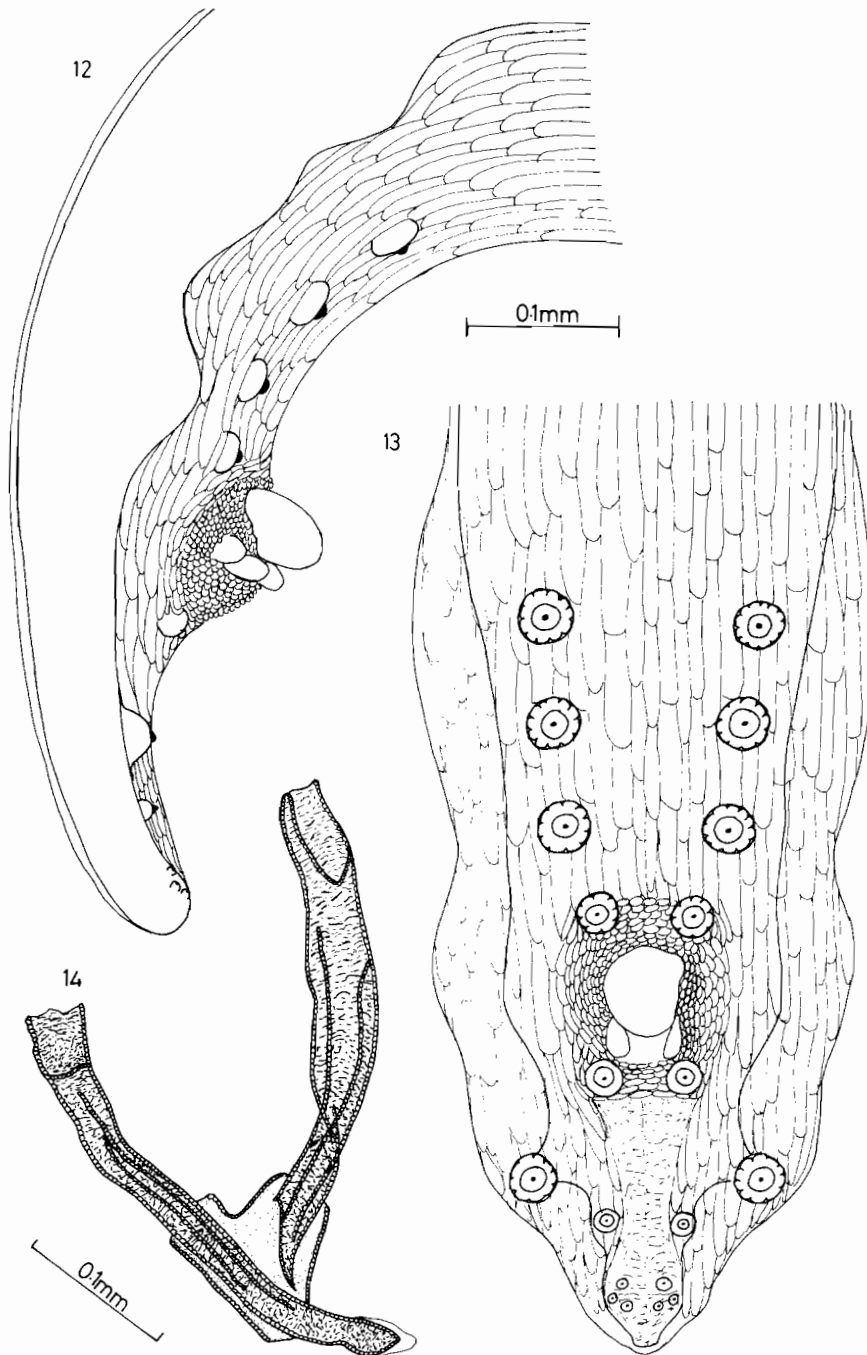
**Fig. 9.** Ventral view in the region of cuticular boss.

**Fig. 10.** Posterior end of male, ventral view.

**Fig. 11.** Tail region of male, ventral view.

**Fig. 12.** Enlargement of cloacal region of male showing the anterior large fleshy plate and the two posterior extensions.





Figs 12–14. *Spirura auriti* n. sp.

Fig. 12. Posterior end of male, lateral view.

Fig. 13. Posterior end of male, ventral view.

Fig. 14. Spicules and gubernaculum.

Small slender worms with slightly attenuated anterior part. The cuticle is transversely striated and there is a small single cuticular boss in the oesophageal region (Fig. 9; Plate II: 9). The lateral alae are very prominent, starting at a level slightly posterior to the nerve ring and extending posteriorly to near the posterior end of the body. The cervical papillae are very small, situated anterior to the lateral alae. The mouth opening is dorso-ventrally elongated and its rim is formed by the chitinous lining of the vestibule which projects on the body surface and has a serrated edge (Plate II: 7, 8). Outside this projection there is a circumoral elongated ring, constricted laterally, which is not chitinous. There are also 6 dentiform formations, 2 dorsal, 2 ventral and 2 lateral, situated between the chitinous lining of the vestibule and the circumoral ring. The two amphids are situated at the base of two large raised triangular-like structures. There are 4 large oval cephalic papillae and no labial papillae could be seen. The vestibule is short and the long oesophagus is divided into a shorter muscular part and a longer glandular part (Fig. 9).

*Male:* Measures 9.72–10.80 mm in length and 0.225–0.262 mm in maximum width attained just in front of the caudal alae. The cuticular boss is situated at a distance of 1.12–1.21 mm from the anterior end. The vestibule is 0.035–0.046 mm long and the muscular and glandular oesophagi are 0.23–0.25 and 3.12–3.62 mm long respectively. The nerve ring and excretory pore are 0.21–0.23 and 0.27–0.32 mm from the anterior end respectively. The spicules are slightly unequal in length, measuring 0.28–0.30 and 0.26–0.28 mm respectively (Fig. 14). The gubernaculum is a V-shaped structure measuring 0.083–0.090 mm in length. The caudal end is ventrally curved and the caudal alae are well developed (Fig. 13). Over a wide area of the ventral surface of the caudal alae there are cuticular tubercles arranged more or less in longitudinal rows, except around the cloacal opening where they are arranged in circles. In lateral view the cloacal region is slightly raised and forms a mamelon-like structure (Fig. 12). In front of the cloaca opening there is a large fleshy plate, and two small fleshy extensions guard the posterior end of the cloaca (Plate II: 10, 11, 12). There are 4 pairs of precloacal papillae but in one specimen there were 6 papillae on one side and only 2 on the other. There are 6 pairs of post-anal papillae: one pair of sessile papillae close behind the cloaca, one pair of large pedunculated papillae situated half-way to the tip of the tail, one smaller sessile pair close behind and three very small pairs near the tip of the tail. The tail is 0.188–0.225 mm long.

*Female:* Tapers gradually anteriorly and posteriorly, measuring 10.28–11.34 mm in length and 0.218–0.235 mm in maximum width attained near the vulvar region. The cuticular boss is 1.16–1.21 mm from the anterior end. The vestibule is 0.045–0.049 mm long and the muscular and glandular oesophagi are 0.281–0.375 and 3.71–3.95 mm long respectively. The nerve ring and excretory pore are 0.225–0.232 and 0.314–0.345 mm from the anterior end. The vulvar opening is not very prominent and is situated at a distance of 7.02–7.30 mm from the anterior end and the ovjector turns posteriorly (Fig. 11). The conical tail measures 0.167–0.204 mm in length (Fig. 12). The eggs measure 0.046–0.051 × 0.023–0.025 mm.

#### *Discussion*

The present specimens are assigned to the genus *Spirura* Blanchard, 1849 because of the shape of the body, the presence of a ventral cuticular boss or lump, the head structure and the structure of the male tail. Adult species of the genus *Spirura* infect insectivores, rodents, marsupials, carnivores and primates. Larval forms have been

reported from insects. So far, 21 species have been assigned to the genus although the validity of some has been disputed. Babero (1973) gave a key to the North American species of the genus and Khalil (1975) constructed a key to the African species. Quentin & Krishnasamy (1975) presented a hypothesis to account for the evolution of the genus based on the consideration of the distribution of the species and the comparative morphology of the adult and larval forms and concluded that the genus *Spirura* arose and became diversified in the Old World in very primitive hosts according to the two main lines of evolution.

The present specimens are very near to *Spirura rytiplerites seurati* which Chabaud (1954) reported from *Aeetechinus algirus*, *Vulpes vulpes atlantica*, *Zorilla lybica* and *Herpestes ichneumon* in North Africa; it was also reported from *Erinaceus auritus* from Tadzhikistan, USSR (Gafurov & Isakov, 1970). The present specimens, however, differ in the structure of the cephalic region, the smaller size of the body being approximately half its size, the much smaller size of the spicules being 0.28–0.30 and 0.26–0.28 against 0.58 and 0.32 mm respectively and in the proportional difference between the two spicules, the smaller size of the gubernaculum and eggs. For these reasons the present specimens are considered new.

They should fit in the third group of the first line of evolution given by Quentin & Krishnasamy (1975) which includes *Spirura rytiplerites rytiplerites* and *Spirura rytiplerites seurati*.

Parasite: *Spirura auriti* n.sp.

Host: *Hemiechinus auritus*

Location: stomach

Locality: Kuwait

Type: the Helminth Collection of the Commonwealth Institute of Parasitology, No. B 1039.

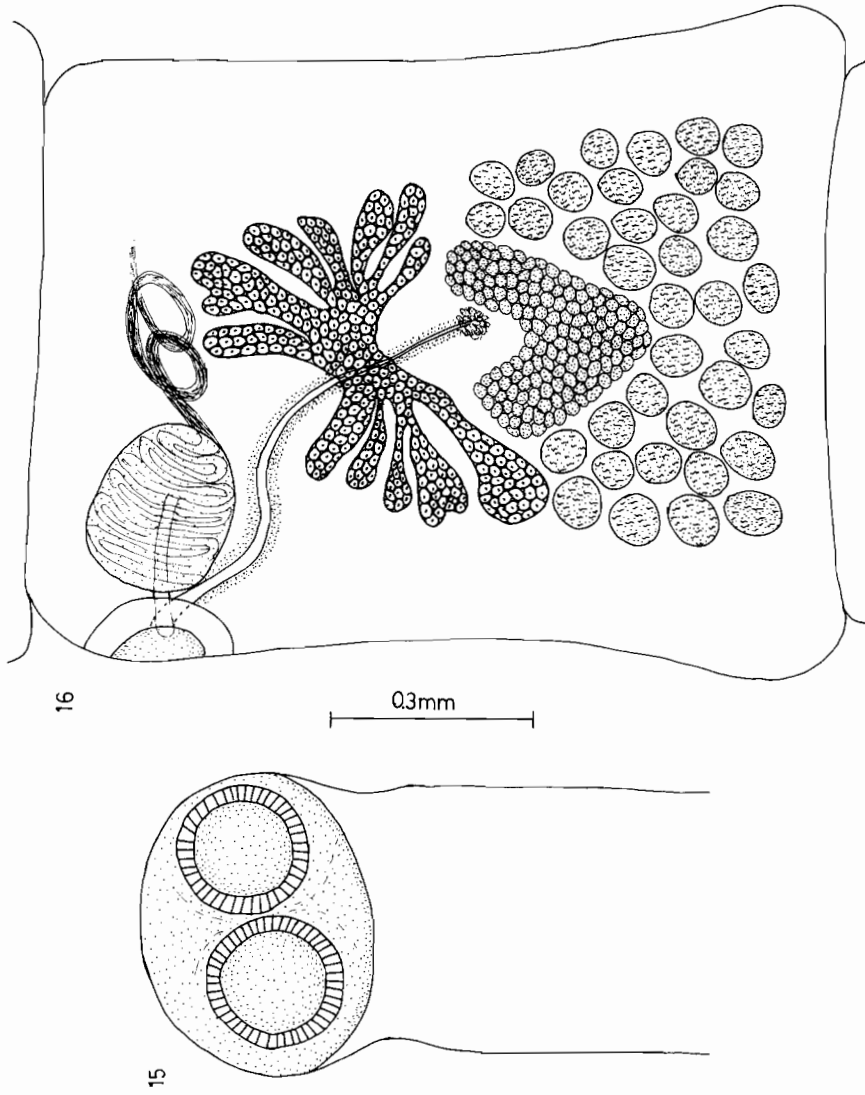
## CESTODA

### Family ANOPLOCEPHALIDAE

#### *Mathevotaenia skrjabini* Spasski, 1949 (Figs 15 & 16)

Five specimens of this cestode were recovered from the intestine of one of the hedgehogs examined. Although three of the specimens were mature no eggs were found. In this genus the uterus is replaced by thin egg capsules, each with a single egg. A brief description of these specimens is given here.

Medium sized cestodes measuring 30–37 mm in length and 0.84–0.88 mm in maximum width attained near the posterior end of the strobila. The scolex is oval, 0.32–0.35 mm in length and 0.42–0.47 mm in width. There are four suckers, slightly longer than wide, measuring 0.187–0.225 × 0.165–0.206 mm (Fig. 15). Behind the scolex there is a short unsegmented neck followed by an area of weak segmentation. The first few segments are wider than long and have no internal structures. Gradually the segments increase in length and primordia of genitalia develop. Near the posterior end of the strobila where there are mature segments with formed genitalia but in which the uterus has not begun to develop the segments are longer than wide, measuring 0.93–1.12 × 0.84–0.88 mm. Longitudinal excretory vessels undulate at



Figs 15–16. *Matheovotaenia skrjabini*.

Fig. 15. Scolex.

Fig. 16. Mature segment.

the sides of the strobila. The genital pores alternate irregularly and open in the anterior third of the segment. The cirrus sac in mature segments is egg-shaped measuring 0.15–0.16 × 0.19–0.23 mm and extends beyond the excretory canals. It is connected by a small neck to the shallow genital atrium. The sperm ducts form numerous convolutions before entering the cirrus sac. The testes are difficult to count accurately as they overlap but there are 49–63 round testes placed posterior and lateral to the female genitalia. The ovary is median, bilobed, and the two lobes are divided into short lobules (Fig. 16). The compact vitelline gland is V-shaped, situated posterior to the ovary. The vagina originates at the genital atrium as a comparatively wide tube posterior to the cirrus sac. It gradually becomes thinner and proceeds to the centre of the segment between the two lobes of the ovary and ends at Mehlis' gland. The vaginal tube has a thick wall and is covered externally by numerous gland cells.

#### Discussion

The present anoplocephalid cestodes are assigned to the genus *Mathevotaenia* Akhumián, 1946 on the basis of their morphology and identified as *M. skrjabini*. Spasski (1949) described this species from the same host (*Erinaceus (Hemiechinus) auritus*) from Central Asia. Since then the species has been reported by Shaldibin (1960) in Barsa-Kelmes island in the Aral Sea (USSR) and by Tenora & Kullmann (1970) in Afghanistan. This is the first record of this species in Kuwait.

The present specimens agree to a great extent with Spasski's description but the number of testes, 49–63, is smaller than the originally reported number of 75–90. The number of testes is extremely difficult to count accurately because these structures overlap in a small space. Variations in numbers of testes sometimes occur as a result of individual, host or regional differences. Examination of a larger sample will no doubt increase the range. In spite of this difference in number the present specimens are very near to *M. skrjabini* and are identified as such.

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الديدان الطفيلية في القنفذ (هيميكينوس أوريتوس) في الكويت ،  
مع وصف نوعين جديدين من الديدان الاسطوانية هما :  
سيوراتوم كويتينسس وسبايرورا أوريتي

جاسم عبد السلام  
قسم علم الحيوان ،  
بجامعة الكويت

لطفى خليل  
معهد الكومنولث للطفيليات ،  
سانت البنز ، هيرتس ، انجلترا

### خلاصة

يشمل هذا البحث دراسة تفصيلية لنوعين جديدين من الديدان الاسطوانية المتطفلة على معدة وأمعاء القنفذ في الكويت . وقد تبين من دراسة الدودة التي عزلت من معدة القنفذ وجود تشابه بينها وبين الدودة سبايرورا ريتبلورايتس ولكن بعد المقارنة الدقيقة اتضح أنها تمثل نوعا جديدا من الديدان الاسطوانية ، وقد أطلق عليها اسم سبايرورا أوريتي نسبة لاسم العائل . أما بالنسبة للدودة الثانية والتي عزلت من أمعاء القنفذ فقد تبين بعد دراستها أنها قريبة من الدودة سيوراتوم تاكابنسي ولكن نظرا لوجود اختلافات جوهرية في التركيب بين الاثنين فإنها تمثل نوعا جديدا من الديدان الاسطوانية ، وقد أطلق عليها اسم سيوراتوم كويتينسس نسبة للكويت حيث يعيش العائل . وكذلك شمل هذا البحث دراسة تفصيلية للدودة الشريطية ماثيفوتينيا سكرجابيني والتي عزلت لأول مرة من أمعاء القنفذ في الكويت .

