FOLIA PARASITOLOGICA 33: 151—155, 1986.

A NEW CAPILLARIID, PARACAPILLARIA KUNTZI SP. N. (NEMATODA: TRICHURIDAE), FROM COLUBRID SNAKES IN TAIWAN

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Abstract. Based on specimens deposited in the British Museum, a new capillariid species, *Paracapillaria kuntzi* sp.n., is described from the snake *Liopeltis major* from Taiwan. In addition to the type host, conspecific female nematodes were also found in the snake *Zaocys dhumnades*. The new species is characterized principally by small body measurements, the shape of the stichocytes, a comparatively short spicule (0.56—0.81 mm), the shape of the seminal vesicle and the posterior end of female body, the structure and size (0.081—0.087 × 0.036—0.042 mm) of the eggs and by a usually conspicuously elevated anterior vulvar lip in the females.

In the Helminthological Collection of the British Museum (Natural History) in London there were several vials containing the specimens of capillariid nematodes, designated as *Capillaria* sp., coming from three species of colubrid snakes (*Liopeltis major*, *Zaocys dhumnades* and *Elaphe carinata*) from Taiwan; no further details (e. g. localization in the host, locality, date of collecting) concerning the nematodes have been available. This material was collected in Taiwan by Dr. R. E. Kuntz (USA) and was donated to the collection of the British Museum by Prof. J. F. A. Sprent (Australia). A re-examination of these specimens has shown that the nematodes from *L. major* represent a new, hitherto undescribed species of the genus *Paracapillaria* Mendonça, 1963. Samples from the two other host species contained only female specimens. Nevertheless, those from *Z. dhumnades* can be assigned to the same species on the basis of the general metrical and morphological similarity of the females. A specific identification of females from *E. carinata* was not possible and these nematodes can be designated as only *Paracapillaria* sp.

The capillariids were stored in 80 % alcohol and for examination they were cleared in glycerine. In the following description measurements are given in millimetres.

Paracapillaria kuntzi sp. n. (Fig. 1)

The following description is based on specimens from *L. major*.

Description: Comparatively small nematodes; cuticle with fine longitudinal striation. Lateral bacillary bands present, not clearly visible. Head end narrow, rounded, oral papillae indistinct. Stichosome consisting of single row of 37—42 short stichocytes, their subdivision into transverse annuli indistinct; always 1—2 darker (more granular) stichocytes alternating with 1 lighter coloured stichocyte; nuclei of stichocytes large, their nucleolus containing several distinct corpuscles. Pair of small wing-like cells present at junction of oesophagus and intestine.

Male (10 specimens; measurements of holotype in brackets): Length of body 7.38—9.55 (8.77), maximum width 0.095—0.150 (0.150). Width of lateral bacillary bands 0.030 to 0.033 (—). Lenght of entire oesophagus 3.47—4.54 (45—50 % of body length) (4.00 (45 %)), of muscular oesophagus 0.273—0.312 (0.306), and of stichosome 3.17—4.23 (3.70); stichocytes 37—40 (39) in number. Distance of nerve ring from anterior extremity

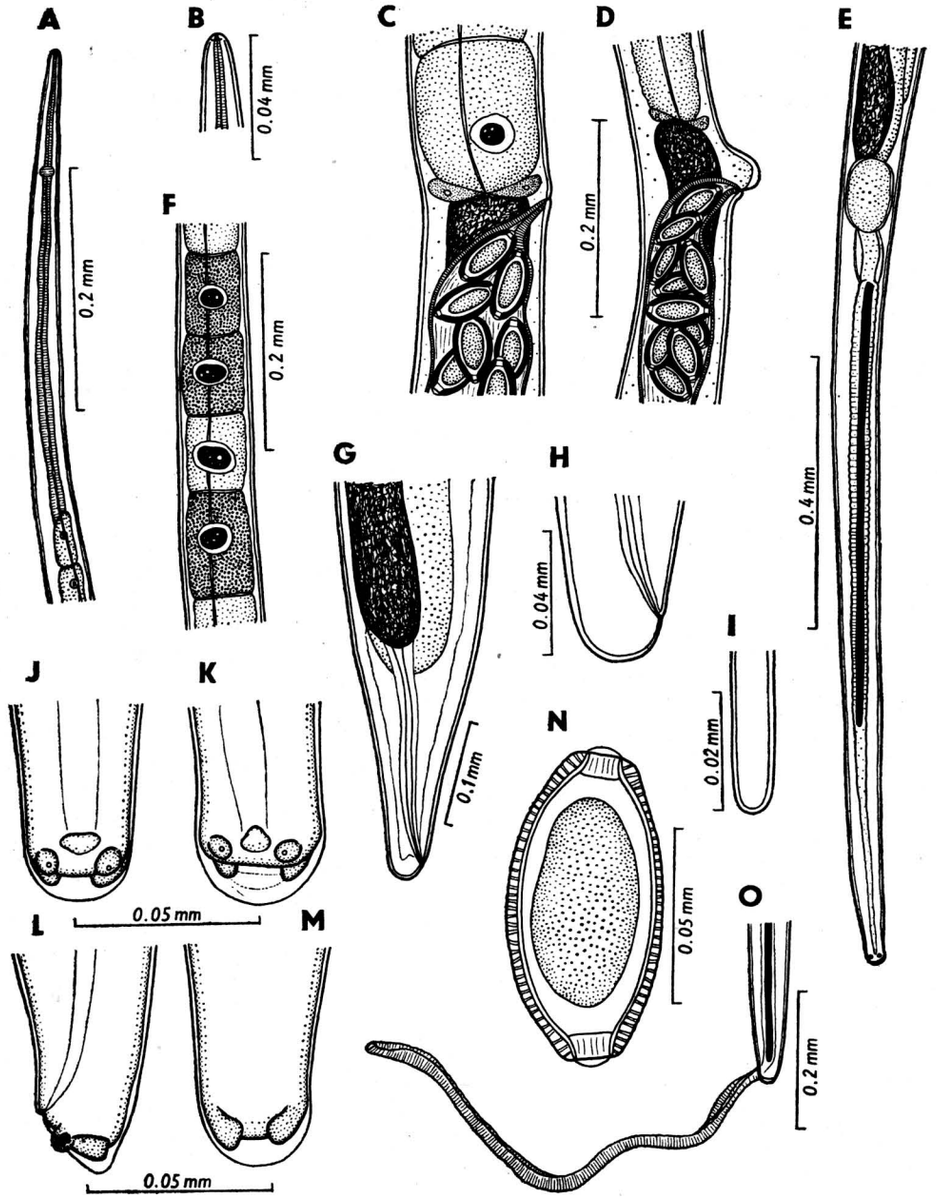

Fig. 1. *Paracapillaria kuntzi* sp.n. from *Liopeltis major*. A, B — head end of female; C — vulva region with indistinct elevation of anterior vulvar lip; D — usual shape of body in vulva region; E — posterior end of male; F — stichosome region of gravid female; G — posterior end of female; H — female tail; I — distal tip of spicule; J, K — tail of male, ventral view; L, M — tail of male, lateral and dorsal views; N — mature egg; O — posterior end of male with evaginated spicular sheath. (I, J, L, M — holotype; A—C, G, H, N — allotype; D—F, K, O — paratypes).

0.075—0.105 (0.090). Spicule slender, well sclerotized, with rounded distal end; length 0.564—0.810 (0.798), width 0.009—0.012. Spicular sheath non-spinous, with dense transverse striations; length of evaginated sheath 0.810 (—), its width 0.024 (—). Middle part of invaginated spicular sheath with many distinct transverse folds. Seminal vesicle oval, conspicuously short (length 0.090—0.135 (0.090)). Posterior end of body rounded, provided with short cuticular membrane forming bluntly rounded bursa; bursa supported by two wide dorso-lateral projections (rays) with somewhat expanded distal ends. One pair of large postanal papillae present at base of caudal projections. Cloacal opening subterminal; anterior lip of cloaca usually distinctly elevated. Length of tail including bursa 0.018—0.024 (0.021), that of bursa itself 0.006—0.009 (0.006). Female (7 specimens; measurements of allotype in brackets): Body length of gravid females 9.28—11.97 (11.97), maximum width 0.122—0.204 (0.204). Maximum width of lateral bacillary bands 0.045 (—). Length of entire oesophagus 4.24—4.62 (38—45 % of body length) (4.53 (38 %)), of muscular oesophagus 0.294—0.518 (0.518), and of stichosome 3.93—4.33 (4.02); stichocytes 39—42 (41) in number. Stichocytes very short, their length slightly exceeding their width. Distance of nerve ring from anterior extremity 0.078—0.096 (0.096). Vulva normally situated at level of posterior end of oesophagus, rarely somewhat below this level (up to 0.075). Anterior lip of vulva usually distinctly elevated, often very markedly (Fig. 1 D), rarely only slightly elevated (Fig. 1 C). Eggs near vulva not in single file, but irregularly arranged in two rows. Mature eggs oval, with flat, slightly protruding polar plugs; egg shell two-layered, outer layer with irregular reticulate sculpturing on surface; content of eggs in uterus uncleaved. Polar plugs of young eggs conspicuously protruded. Length of mature eggs including polar plugs 0.081—0.087 (0.081—0.084), their width 0.036—0.042 (0.039—0.042), and thickness of their wall 0.004—0.005 (0.0045). Height of whole polar plug 0.009 (0.009), of its protruding part 0.003 (0.003), width of plug 0.009 (0.009). Posterior end of body distinctly tapered from level of posterior end of intestine (Fig. 1 G); length of rectum 0.141—0.177 (0.177). Anus subterminal; length of tail 0.015 (0.015); tail bluntly rounded. Posterior end of ovary approximately at level of junction of intestine and rectum.

Site: unknown (? intestine).
Hosts: Snakes *Liopeltis major* (type host) and *Zaocys dhumnades* (both fam. Colubridae).
Locality: Taiwan.
Specimens: British Museum (Natural History), London (Reg. Nos. 1984. 3293 — holotype (♂) 1984.3294 — allotype (♀); 1984.3295—3325 — paratypes from *L. major;* 1984.3326—3331 — other specimens (only females) from *Z. dhumnades*). Institute of Parasitology, Czechoslovak Academy of Sciences, České Budějovice (Reg. No. N 159 — paratypes (♂ + ♀) from *L. major*).

DISCUSSION

Although 13 nominal species of nematodes of the subfamily Capillariinae have so far been described from snakes, only the following 7 species can be considered valid according to a recent revision carried out by the first author of this paper (Moravec 1984, 1986). They all belong to the genus *Paracapillaria*, being *P. longispicula* (Sonsino, 1889), *P. sonsinoi* (Parona, 1897), *P. modiglianii* (Parona, 1897), *P. murinae* (Travassos, 1914), *P. cesarpintoi* (Freitas et Lent, 1934), *P. madagascariensis* (Ghadirian, 1968) and *P. congolensis* Moravec, 1986 (in press) (see Moravec 1984, 1986). *Paracapillaria* spp. from snakes constitute an independent subgenus *Ophidiocapillaria* Moravec, 1986. However, the morphology of some of these species has hitherto been inadequately known.

Only three of the named species are noted as having a spicule distinctly shorter than 1 mm: these are *P. modiglianii* from Indonesia, *P. cesarpintoi* (syn. *C. amarali* Freitas et Lent, 1934) from Brazil and *P. madagascariensis* from Madagascar. However, the last named species possesses, in contrast to *P. kuntzi* sp.n., a conspicuously short spicule (only 0.055 mm long) and the length of its gravid females is approximately double that of the latter (21—23 mm). In the inadequately described species *P. modiglianii* and *P. cesarpintoi* the length of spicule is 0.040—0.057 mm, thus resembling *P. kuntzi* sp. n. somewhat. In addition, the size of body in all three species is much the same. Nevertheless, *P. cesarpintoi* can be distinguished from *P. kuntzi* sp.n. by a different length ratio of the anterior (oesophageal) and the posterior parts of the body in females (approximately 1 : 3 versus 1 : 1.2—1.6), smaller eggs (0.040—0.057×0.022—0.024 mm as opposed to 0.081—0.087×0.039—0.042 mm) and also the geographical distribution of both these species (South America versus Eastern Asia) should be taken into account.

A comparison of *P. kuntzi* sp.n. with *P. modiglianii* is rather difficult due to a poor original description of the latter species, the type specimens of which are unfortunately lost. Some of its features (length of spicule 0.5 mm, elevated vulvar lips, similar ratio of oesophagus length to body length, size of eggs) indicate a resemblance to *P. kuntzi* sp.n.; but, according to the original description given by Parona (1897, 1898), the spicular sheath of *P. modiglianii* is not striated (in contrast to *P. kuntzi* sp.n.), being allegedly covered by spines. However, the presence of spines on the spicular sheath of this species is improbable (see Moravec 1984, 1986). In spite of certain morphological differences between *P. modiglianii* and *P. kuntzi* sp.n. (presence of a striated spicular sheath, somewhat larger eggs and longer spicule in *P. kuntzi* sp.n.), it is also necessary to consider the fact that these species are reported from hosts belonging to different families (Crotalidae and Colubridae) from different geographical regions. A more detailed comparison between the two species will only be possible after a relevant redescription of *P. modiglianii*, based on topotypic material, is available.

A new capillariid species, *Capillaria ptyasi*, has recently been described by Wang (1982) from China (Fujian Province) from the gut of the snake *Ptyas mucosus* (fam. Colubridae). According to the length of its spicule (0.092—1.12 mm) this species also resembles *P. kuntzi* sp.n. Despite the inadequate description of this species, Moravec (1984, 1986) synonymized *C. ptyasi* with the widespread holarctic species *Paracapillaria sonsinoi* (Parona, 1897). This morphologically and metrically variable species differs from *P. kuntzi* sp.n. mainly in the shape of the stichocytes, which are very elongate, in the larger spicule, the very elongate seminal vesicle, in the shape of the posterior end of female, which is not conspicuously tapered, and in the absence of an elevated vulvar lip.

Consequently, it is necessary to consider the nematodes from *Liopeltis major* as an independent species, for which we propose the name *P. kuntzi* sp.n. Furthermore, the female nematodes from *Zaocys dhumnades* (BM (NH) Reg. Nos. 1984-3326-3331), being morphologically and metrically almost identical with females from *L. major*, can be assigned to the same species. On the other hand, the only available complete female from *Elaphe carinata* (BM (NH) Reg. Nos. 1984-3332-3333) has measurements similar to those of the females of *P. kuntzi* sp.n. (body length 12.88 mm, oesophagus length 6.46 mm, number of stichocytes 43, size of eggs 0.075—0.081×0.036 mm) and notably an elevated anterior lip of the vulva, but its stichocytes are more elongate and distinctly subdivided into several transverse annuli. Since no males are available, we are designating it as *Paracapillaria* sp., although conspecifity with *P. kuntzi*. sp.n. cannot be excluded.

НОВАЯ КАПИЛЛЯРИИДА, *PARACAPILLARIA KUNTZI* SP.N. (NEMATODA: TRICHURIDAE) ОТ ПОЛОЗОВ ТАЙВАНЯ

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Резюме. Описан новый вид капилляриды, *Paracapillaria kuntzi* sp.n., от *Liopeltis major* из Тайваня на основе экземпляров, уложенных в Британском Музее. Кроме типичного хозяина, конспецифические самки нематоды были найдены также у *Zaocys dhumnades*. Характерными признаками нового вида являются, главным образом, небольшие размеры тела, форма стихоцитов, сравнительно короткая спикула (0,56—0,81 мм), форма семенного пузырька и заднего конца самки, структура и размер яиц (0,081—0,087 х 0,036—0,042 мм) и обыкновенно поднятая передняя губа вульвы у самок.

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Received 22 November 1984.

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FOLIA PARASITOLOGICA 33: 155—156, 1986.

THE ABSENCE OF AN INTERACTION BETWEEN A MICROTUS PENNSYLVANICUS DENSITY CYCLE AND DERMACENTOR VARIABILIS INFESTATION LEVELS

Microtus pennsylvanicus, one of the dominant hosts for the immature *Dermacentor variabilis* in Massachusetts (Smith C. N. et al., USDA Tech. Bull. 905: 1—74, 1946), has the typical 4—5 year intrinsic microtine density dependent cycle (Krebs C. J., Myers J. H., Adv. Ecol. Res. 8: 267—399, 1974). Therefore, it could be expected that a population cycle of this host would be reflected in the infestation of adult *D. variabilis*.

A *M. pennsylvanicus* cycle was followed at Barnstable on Cape Cod Massachusetts by Tamarin (Ecology 58: 1310—1321, 1977). During this period, the adult *D. variabilis* infestation levels were followed in both an area contiguous to the *M. pennsylvanicus* study site, and at other sites on Cape Cod (McEnroe W. D., Acarologia 16: 651—662, 1975; Rec. Adv. in Acarology 2: 145—153, 1979, and unpublished). The level of spring tick infestation was compared to the *M. pennsylvanicus* cycle.

The spring adult tick cohort enters activity during a period of low water stress. This results in maximum activity (Mc Enroe W. D., McEnroe M. A., Acarologia 15: 37—42, 1973). The value for infestation level was taken from