

***Witenbergitaenia sinaica* gen. n., sp. n. (Anoplocephalidae) and other Cestodes from small Mammals in Israel and in the Sinai Peninsula**

by Guta WERTHEIM, Gerald D. SCHMIDT and Zalman GREENBERG

Abstract. — Twelve species of Cestodes are reported from twenty species of small mammals recovered in Israel and Sinai. Eight other adult Cestodes were identified to genus only. New host and locality records are indicated in table 1 and in the text. *Witenbergitaenia sinaica* gen. n., sp. n., found in *Acomys cahirinus* in southern Sinai, differs from *Markewitchitaenia* and *Tupaiaetaenia*, the only other genera in Anoplocephalidae with a hermaphroditic canal, in having two postovarian fields of testes.

Résumé. — *Witenbergitaenia sinaica* n. g., n. sp. (Anoplocephalidae) et autres Cestodes parasites de petits Mammifères d'Israël et de la péninsule du Sinaï. — Douze espèces de Cestodes ont été trouvées chez vingt espèces de petits mammifères récoltés en Israël et dans la péninsule du Sinaï. Huit autres Cestodes adultes ont été identifiés seulement jusqu'au niveau générique. Les nouveaux hôtes et les nouvelles localités sont indiqués dans le tableau 1 et dans le texte. *Witenbergitaenia sinaica* n. g., n. sp., récoltée chez *Acomys cahirinus* dans le sud du Sinaï, diffère de *Markewitchitaenia* et de *Tupaiaetaenia*, les seuls autres genres d'Anoplocephalidae possédant un canal hermaphrodite, par la présence de deux champs de testicules postovariens.

G. WERTHEIM, Laboratory of Helminthology, the Hebrew University-Hadassah Medical School, Jerusalem, Israel.
Temporary adress : Professeur Associée, Laboratoire de Zoologie (Vers) associé au CNRS, Muséum national d'Histoire naturelle, 61, rue Buffon, F 75231 Paris, France.

G. D. SCHMIDT, Department of Biology, University of Northern Colorado, Greeley, Co. 80639, USA.

Z. GREENBERG, Laboratory of Helminthology, the Hebrew University-Hadassah Medical School, Jerusalem, Israel.
Present adress : Ministry of Health, Government Central Laboratories, P.O. Box 6115, Jerusalem, Israel.

INTRODUCTION

In a previous publication (SCHMIDT, GREENBERG and WERTHEIM, 1986) survey data on avian Cestodes were reported as well as information on collection sites and techniques used in processing and mounting the specimens. The present communication deals with Cestodes recovered from small mammals, mostly rodents.

The earliest findings on Cestodes, published with the initiation of helminthological studies in Israel (then Palestine), dealt with the fauna of domestic and wild carnivores possibly because of the importance of these animals as a source of human infections. In stray dogs and cats, WITENBERG (1932, 1933, 1934a, b) found five species of Dilepidinae, one species of Mesocestoididae (genus *Mesocestoides*) and five species of Taeniidae, among them *Echi-*

nococcus granulosis (recorded also from the jackal *Canis aureus*). From the presence of some of these taeniids one could infer that their larval forms will be found in rodents or other small mammals. This was later proven when extensive studies of these animals were undertaken. *Cysticercus* of *T. taeniaeformis*, for example, was reported from rats (WERTHEIM, 1963) and from *Nesokia indica*, Rodentia-Muridae (GREENBERG, 1972). Other cestodes from rodents, so far reported include *Megittina gerbilli*, *Hymenolepis diminuta* and *Vampirolepis nana* (WERTHEIM, 1954, 1963). *Vampirolepis negevi* (= *Rodentolepis negevi*), *Pseudandrya monardi* and *Mathevotaenia symmetrica* (reported as *M. rodentinum*) (GREENBERG, 1969); *Sinaiotaenia witenbergi* (WERTHEIM and GREENBERG, 1971) and *Paranoplocephala* sp. (WERTHEIM and NEVO, 1971).

The present paper summarizes findings from examination of over two thousand small mammals as well as new host and locality records. All locality records from Sinai are new. In the data on four species of Cestodes from rodents in Sinai presented in a previous report (WERTHEIM and GREENBERG, 1970) only the hosts are listed.

RESULTS

Cestodes identified in this study, as well as data on hosts and localities, are summarized in table 1. Classification follows SCHMIDT (1986). Measurements are in micrometers unless otherwise stated. The letter n indicates the number of measurements made. One species is recognized as new and as representing a new genus. We place it within the Linstowiinae because the eggs lack a pyriform apparatus and there is only one egg per capsule.

DESCRIPTION

WITENBERGITAENIA gen. n.

DIAGNOSIS : Anoplocephalidae, Linstowiinae. Dorsoventrally flattened, becoming wider evenly toward the gravid segments. Immature segments wider than long, mature segments about as long as wide, gravid segments longer than wide. Scolex lacking rostellum, hooks or apical organ. Suckers round, powerful, unarmed. Neck present, narrower than scolex. Proglottids numerous, slightly craspedote. Osmoregulatory canals reticulated throughout proglottid. This canal system is identical with that described for *Atriotaenia procyonis* (Chandler, 1942), by GALLATI (1959), to which the reader is referred. Muscle bundles feebly developed. One set of reproductive organs per segment; genital pores irregularly alternating. Genital atrium well developed, lacking sphincter muscles, smaller than cirrus pouch. Genital ducts dorsal to osmoregulatory canals. Testes in two lateral fields, mainly postovarian, some lateral to ovary, between outer limits of osmoregulatory canals. Cirrus pouch elongate, crossing outermost osmoregulatory canals, usually reaching poral edge of ovary. Cirrus absent. Internal and external seminal vesicles absent. Ovary median, with bilateral wings subdivided into slender lobes. Vitellarium with small lobes, posterior to ovary. Vagina posterior to cirrus pouch. Distal end of vagina entering, with cirrus pouch, into common hermaphroditic canal that enters genital atrium. Seminal receptacle small, remaining discrete in gravid segments. Uterus deve-

lops as a thin-walled, reticular sac, which quickly fills and disappears, leaving abundant developing eggs evenly scattered throughout the medullary parenchyma. Oncospheres each surrounded by a single, thin-walled membrane; pyriform apparatus absent.

TYPE SPECIES : *Witenbergitaenia sinaica* sp. n.

***Witenbergitaenia sinaica* sp. n.**

(Fig. 1, A to D)

MATERIAL STUDIED : One specimen found in 1 out of 152 host-animals examined.

DESCRIPTION

With the characters of the genus, as described above. Scolex (fig. 1A) about 480 long (measured to posterior constriction of scolex), 640 greatest width. Suckers round, 175 to 200 wide. Neck narrower than scolex, about 1.0 mm long. Strobila 71 mm long (although as much as one-fourth may be missing in the prepared slide), about 1.5 mm wide in mature portion, 2.0 mm wide in gravid segments. Proglottids slightly craspedote, anapolytic. Male and female gonads (fig. 1B) mature at same time. Genital ducts dorsal to osmoregulatory canals (fig. 1C).

Male genitalia : 41 to 62 testes ($n = 7$) in two fields of 23 to 29 (poral) and 18 to 33 (aporal), mainly posterior to ovary. Testes ($n = 23$) 60 to 100 wide in mature segments. Cirrus pouch (fig. 1C) ($n = 7$) elongate, narrowed proximally, usually reaching but not exceeding poral margin of ovary, 240 to 270 long, 60 greatest width. Internal and external seminal vesicles absent. Ejaculatory duct and vas deferens coiled. Cirrus absent.

Female genitalia : Ovary median, with bilateral wings subdivided into lobules; not reaching main lateral osmoregulatory canals; maximum size ($n = 7$) 345 to 480 long, 560 to 680 wide. Vitellarium ($n = 7$) posterior to ovary, lobated, 160 to 200 long, 175 to 255 greatest width. Vagina posterior to cirrus pouch, unarmed, proceeding directly to seminal receptacle, which lies between ovary and vitellarium. Seminal receptacle ($n = 7$) a simple sac 120 to 140 long, 60 to 90 wide in mature segments, slender with a single loop in gravid segments. Distal end of vagina joins hermaphroditic duct with cirrus pouch before opening into genital atrium. Atrium ($n = 7$) 70 deep, 20 to 30 wide at distal end, 10 wide at base, not exceptionally muscular or glandular. Eggs (fig. 1D) surrounded by single membrane, 54 to 64 wide ($n = 10$). Oncospheres 30 to 40 wide; oncosphere hooks 14 to 16 long.

TYPE HOST : Egyptian spiny mouse, *Acomys cahirinus*¹ Desm., 1819. Rodentia, Muridae.

LOCATION : Small intestine.

LOCALITY : Wadi Atzvira (Southern Sinai).

TYPE SPECIMEN : MNHN (Muséum national d'Histoire naturelle, Paris) holotype n° 641 HB.

ETYMOLOGY : The genus is named in honor of the late Professor George WITENBERG, who pioneered in helminthology in Israel.

1. In a previous publication (WERTHEIM and GREENBERG, 1970) the *Acomys* from Sinai was temporarily named *A. dimidiatus*. Professor WAHRMAN informs us (personal communication) that at a later date, it was chosen, for the time being, to use the name *A. cahirinus* for all the chromosomal forms.

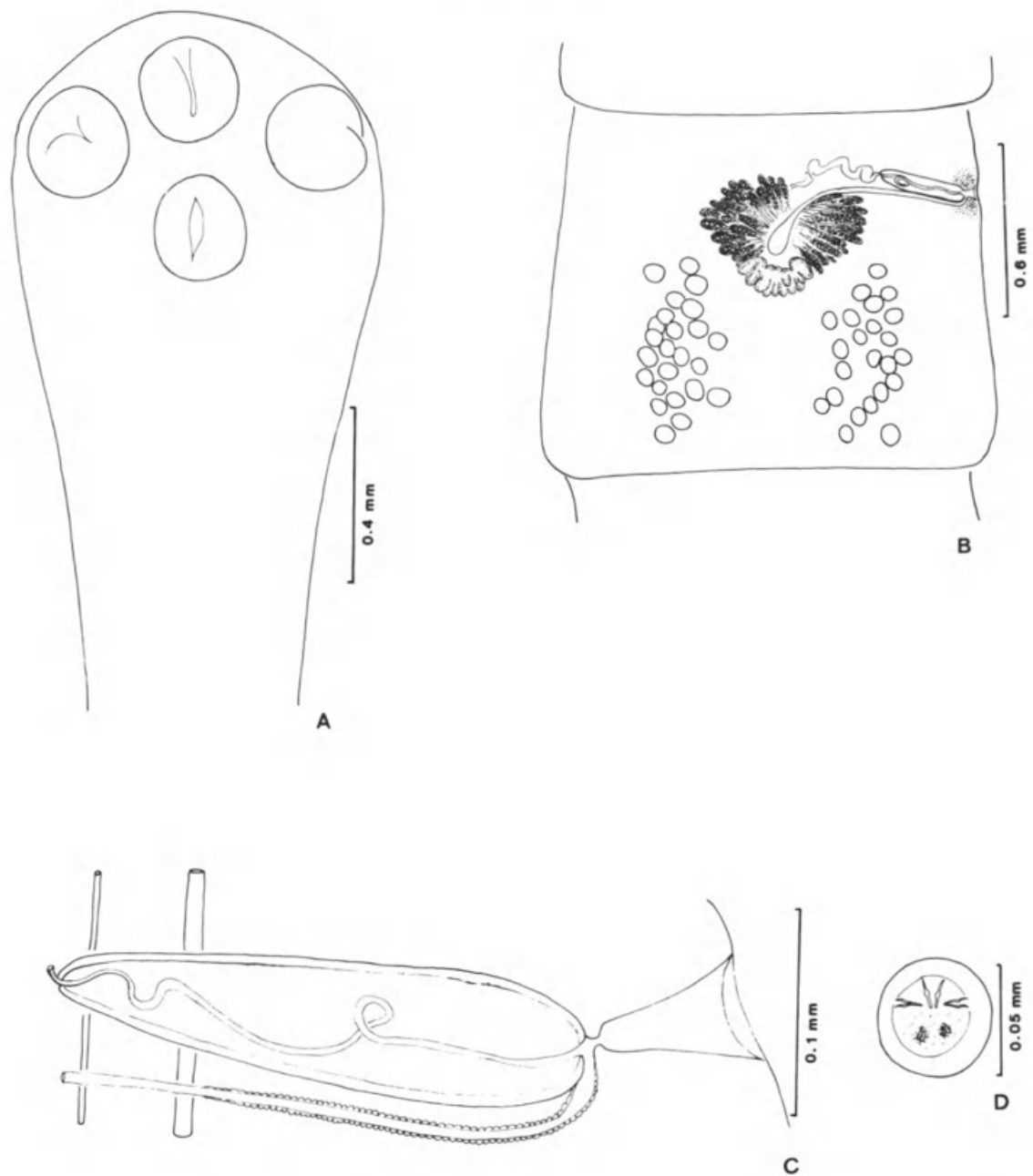


FIG. 1. — *Witenbergitaenia sinaica* sp. n. from *Acomys cahirinus* : A, scolex ; B, mature proglottid ; C, terminal genital ducts ; D, egg.

DISCUSSION

To date there are two genera in the anoplocephalid subfamily Linstowiinae with a common hermaphroditic canal as in the present species : *Markewitchitaenia* Sharpilo and Korniyushin, 1975, and *Tupaiaetaenia* Schmidt and File, 1975. *Tupaiaetaenia*, from tree shrews, is unique in possessing a cirrus and muscular lappets on the suckers.

The present species is most similar to *Markewitchitaenia* but clearly differs from it in having two lateral fields of large testes, instead of a single field of small testes.

Because the presence of two fields of testes versus one field has traditionally been accepted as a generic character (as in *Kowalewskiella*, *Schizorchis*, *Cycloskrjabinia*, *Laterotaenia* and many others) we propose our new species to represent a new genus and name it *Witenbergitaenia*.

In order to show that *W. sinaica* is not a deviant *M. rodentinum* (Joyeux, 1927) — the only species in *Markewitchitaenia* — the following comparisons are given : (1) the gravid strobila of *M. rodentinum* is about 44 mm long by 710 μ m greatest width, compared with at least 70 mm long by 2.0 mm greatest width in *W. sinaica* ; (2) the cirrus pouch of *M. rodentinum* is 137 to 154 μ m long by 33 to 38 μ m wide and reaches the midline level of the ovary, while that of *W. sinaica* is 240 μ m long by 64 μ m wide and barely reaches the poral edge of the ovary ; (3) the total number of testes is 33 to 47 (usually 38 to 40) in *M. rodentinum*, compared with 41 to 62 in *W. sinaica*. Thus it is clear that two different species are represented.

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TABLE 1. — Cestodes from small mammals of Israel and Sinai.

HOST	CESTODE	LOCALITY	*HUJP Vaucher no.
<i>Acomys cahirinus</i> Desm., 1819	<i>Hymenolepis diminuta</i> (Rudolphi, 1819)	Bar Giyora, Zova	1943
	<i>Witenbergitaenia sinaica</i> gen. n., sp. n.	† Wadi Atzvira	S140
	*** <i>Mathevotaenia symmetrica</i> (Baylis, 1927)	Elat, † Sharm el Sheikh, † Wadi Azvira, † Wadi Latai, † Wadi Ajar	S211
	<i>Mathevotaenia</i> sp.	Timna	2025
	<i>Pseudandrya monardi</i> Fuhrmann, 1943	Jerusalem, **Bet Alpha, Ein Far'a	232
	<i>Tetrathyridium</i>	Jerusalem, Zova, Dimona, Ein Hussub, † Mitla Pass, † Monastery of St. Catherine, † Wadi Kid, † Wadi Abu G'eada	
	<i>Vampirolepis nana</i> (Siebold, 1852)	Jerusalem, † Monastery of St. Catherine	S275

HOST	CESTODE	LOCALITY	*HUIP Vaucher no.
	<i>Vampirolepis negevi</i> (Greenberg, 1969)	Elat, Yotvata, Wadi Mè-nayeh, † Dahab † El Tur, † Ras Nusrani, † Wadi Isla, † Wadi Kid Masada	2039
<i>Acomys russatus</i> Wagner, 1840	Tetrathyridium		
<i>Apodemus mystacinus</i> Danf. and Alst., 1877	<i>Paranoplocephala</i> sp.	**Ein Hemed	524A
	<i>Taenia taeniaeformis</i> (Batsch, 1786) strobilocercus	**Jerusalem, **Ein Hemed	
<i>Gerbillus (Dipodillus) dasyurus</i> Wagner, 1842	<i>Meggittina gerbilli</i> (Wertheim, 1954)	**Elat, **Jerusalem, † Gebel Abu Zarub, † Monastery of St. Catherine, † Wadi Abu G'ea-da	1956
	<i>Sinaiotaenia witenbergi</i> Wertheim and Greenberg, 1971	† Gebel Yi'allaq	S486
	<i>Taenia</i> sp. coenurus	Ein Hazeva	
<i>Gerbillus allenbyi</i> Thomas, 1918	Tetrathyridium	† Gebel Yi'allaq	
	*** <i>Raillietina</i> (R.) <i>trapezoides</i> (Janicki, 1904)	**Herzliya, **Caesarea	854A
<i>Gerbillus gerbillus</i> Olivier, 1801	<i>Mathevotaenia symmetrica</i>	† Abu Rudeis, † El Tur, † Nabq	S53
	*** <i>Meggittina gerbilli</i>	**Be'er Sheva, † Mitla Pass	2203
	*** <i>Raillietina</i> (R.) <i>trapezoides</i>	**Be'er Sheva	
	<i>Sinaiotaenia witenbergi</i>	† Wadi Nafk	
	*** <i>Taenia pisiformis</i> (Bloch, 1780) cysticercus	† Abu Zenima, † Bir Gafgafa	S65
<i>Gerbillus pyramidum</i> Geoffroy, 1825	*** <i>Mathevotaenia symmetrica</i>	† Ras Sudar, † Sharm el Sheikh	S386
	<i>Meggittina gerbilli</i>	Be'er Sheva, Holon, **Palmachim, **Rishon le Ziyon, † Bir Gafgafa	862
	*** <i>Raillietina</i> (R.) <i>trapezoides</i>	Be'er Sheva, **Hadassim, **Holon, **Palmachim, **Rishon le Ziyon	
	<i>Taenia taeniaeformis</i> strobilocercus	**Holon	81
<i>Jaculus jaculus</i> L., 1758	*** <i>Raillietina</i> (R.) <i>trapezoides</i>	† Sabkhet el Bardawil, † El'Arish	S489
<i>Meriones crassus</i> Sund., 1842	**** <i>Hymenolepis</i> sp.	Wadi Taiyiba	S288
	*** <i>Meggittina gerbilli</i>	† Mitla Pass	S470
	*** <i>Raillietina</i> (R.) <i>trapezoides</i>	**Nizana	1608
	<i>Sinaiotaenia witenbergi</i>	† Mitla Pass, † Wadi Ak-dar	S470
	*** <i>Taenia</i> sp. polycephalus cyst	**Ein Yahav	
	Tetrathyridium	† Mitla Pass	
<i>Meriones sacramenti</i> Thomas, 1922	<i>Hymenolepis diminuta</i>	Holon	857
	*** <i>Raillietina</i> (R.) <i>trapezoides</i>	Holon, Palmachim, **Ne-bi Rubin	858

HOST	CESTODE	LOCALITY	*HUJP Vaucher no.
<i>Meriones tristrami</i> Thomas, 1892	<i>Hymenolepis diminuta</i> **** <i>Hymenolepis</i> sp. *** <i>Raillietina</i> (R.) <i>trapezoides</i> *** <i>Vampirolepis nana</i> *** <i>Taenia pisiformis</i> cysticercus Tetrathyridium	**Mishmar Ha'Emek Mishmar Ha'Emek **Mishmar Ha'Emek **Mishmar Ha'Emek **Mishmar Ha'Emek Akko	19 465 37 16 8
<i>Microtus guentheri</i> Danf. and Alst., 1880	**** <i>Andrya</i> sp.	Mishmar Ha'Emek	105
<i>Mus musculus</i> L., 1758	<i>Vampirolepis nana</i> <i>Catenotaenia pusilla</i> (Goeze, 1782)	Mishmar Ha'Emek **Aminadav	290 511A
<i>Nesokia indica</i> Gray and Hardw., 1832	<i>Hymenolepis diminuta</i> <i>Taenia taeniaeformis</i> strobilocercus	Jericho Jericho	2204
<i>Procavia capensis</i> Pallas, 1766	**** <i>Inermicapsifer</i> sp.	Gilboa	1657
<i>Psammomys obesus</i> Cretzmar, 1828	*** <i>Raillietina</i> (R.) <i>trapezoides</i>	**Jericho	
<i>Rattus rattus</i> L., 1758	<i>Hymenolepis diminuta</i> <i>Vampirolepis nana</i>	Tel Aviv, **Rosh Pina **Rosh Pina	1642
<i>Rattus norvegicus</i> Berk, 1769	<i>Hymenolepis diminuta</i> <i>Taenia taeniaeformis</i> strobilocercus <i>Vampirolepis nana</i>	Haifa, Tel Aviv (ports) Tel Aviv Haifa, Tel Aviv (ports)	
<i>Sekeetamys calurus</i> Thomas, 1892	**** <i>Hymenolepis</i> sp. <i>Hymenolepis</i> sp. (juv.) <i>Sinaiotaenia witenbergi</i> *** <i>Taenia pisiformis</i> cysticercus	Gebel Abu Zrur † Gebel Sorbal † Gebel el Tin, † Wadi el Sheikh **Wadi Milhek, † Gebel Abu Zrur Kuneitra	S382 S66 S382 N24
<i>Spalax ehrenbergi</i> Nehring, 1898	**** <i>Paranoplocephala</i> sp.		

*HUJP : Hebrew University Jerusalem, Parasitological Collection.

† A site in the Sinai peninsula.

**New locality record in Israel.

***New host record.

****To be discussed in a later publication as it may represent a new species.

LITERATURE CITED

- GALLATI, W. W., 1959. — Life history, morphology and taxonomy of *Atriotaenia* (*Ershovia*) *procyonis* (Cestoda : Linstowiidae), a parasite of the raccoon. *J. Parasit.*, **45** : 363-377.
- GREENBERG, Z., 1969. — Helminths of mammals and birds of Israel. I. Helminths of *Acomys* spp. (Rodentia, Murinae). *Israel J. Zool.*, **18** : 25-38.
- 1973. — Helminths of birds and mammals from Israel. IV. Helminths from *Nesokia indica* Gray and Hardwicke, 1832 (Rodentia, Muridae). *Israel J. Zool.*, **21** : 63-70.
- SCHMIDT, G. D., 1986. — Handbook of Tapeworm identification. CRC Press, Boca Raton, 675 p.
- SCHMIDT, G. D., and S. FILE, 1977. — *Tupaia taenia quentini* gen. et sp. n. (Anoplocephalidae : Linstowiinae) and other tapeworms from the common tree shrew, *Tupaia glis*. *J. Parasit.*, **63** : 473-475.

- SCHMIDT, G. D., Z. GREENBERG, and G. WERTHEIM, 1986. — *Raillietina (Raillietina) alectori* sp. n. and other avian Cestodes from Israel and Sinai. *Bull. Mus. natn. Hist. nat., Paris*, 4^e sér., **8**, section A, (1) : 101-109.
- SHARPILO, V. P., and V. U. KORNYUSHIN, 1975. — A new genus of cestodes : *Markewitchitaenia* gen. nov. (Cestoda, Linstowiidae). *Parazity i Parazitozy Zhivotnykh i Cheloveka*, Kiev, USSR « Naukova Dumka » : 217-222.
- WERTHEIM, G., 1954. — A new anoplocephalid cestode from the gerbil. *Parasitology*, **44** : 446-449.
- 1963. — Helminth parasites of the rat *Rattus norvegicus* from Haifa and Tel-Aviv. *Bull. Res. Coun. Israel*, **10 E** : 125-129.
- WERTHEIM, G., and Z. GREENBERG, 1970. — Notes on Helminth parasites of myomorph rodents from Southern Sinai. *J. Helminth.*, **44** : 243-252.
- WERTHEIM, G., and Z. GREENBERG, 1971. — Helminths of mammals and birds from Israel. II. *Sinaio-taenia witenbergi* gen. et sp. n. (Cestoda Anoplocephalidae) from desert rodents. *Proc. Helminth. Soc. Wash.*, **38** : 93-96.
- WERTHEIM, G., and E. NEVO, 1971. — Helminths of birds and mammals from Israel. III. Helminths from chromosomal forms of the mole-rat, *Spalax ehrenbergi*. *J. Helminth.*, **45** : 161-169.
- WITENBERG, G., 1932. — On the cestode subfamily Dipylidiinae Stiles. *Z. ParasitKde.*, **4** : 542-584.
- 1933. — Zur Kenntnis der Verbreitung von Echinokokkus und Trichina in Palestina. *Arch. Schiffs-u. Tropenhyg.*, **37** : 37-41.
- 1934a. — Parasitic worms of dogs and cats in Palestine. *The Veterinary Record*, **14** : 232-239.
- 1934b. — Studies on the cestode genus *Mesocetoides*. *Archo zool. ital.*, **20** : 467-507.



Wertheim, Guta, Schmidt, Gerald D., and Greenberg, Zalman. 1986.
"Witenbergitaenia sinaica gen. n., sp. n. (Anoplocephalidae) and other
Cestodes from small Mammals in Israel and in the Sinai Peninsula." *Bulletin
du Muséum national d'histoire naturelle* 8(3), 543–550.

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