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## A NEW SPECIES OF *Oochoristica* (CESTODA, LINSTOWIIDAE) FROM THE ARABIAN TOAD-HEADED AGAMA, *Phrynocephalus arabicus* (SAURIA, AGAMIDAE), FROM THE UNITED ARAB EMIRATES

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**A New Species of *Oochoristica* (Cestoda, Linstowiidae) from the Arabian Toad-Headed Agama, *Phrynocephalus arabicus* (Sauria, Agamidae), from the United Arab Emirates.** Schuster R. K. — Eight complete strobilae of *Oochoristica phrynocephali* Schuster, sp. n. were recovered from small intestines of 4 out of 13 Arabian toad-headed agamas, *Phrynocephalus arabicus* from Dubai emirate, United Arab Emirates. *O. phrynocephali* belongs to a group of *Oochoristica* species possessing circular suckers and fewer than 25 testes in a single cluster. It can be distinguished from *O. sobolevi*, *O. elongata*, *O. parvogenitalis*, *O. feluii*, *O. jonnesi*, *O. macallisteri*, *O. lygosomatis*, *O. junkea* and *O. novaezealandae* by smaller scolices and lesser diameter of suckers.

**Key words:** *Oochoristica phrynocephali*, Cestoda, Linstowiidae, Arabian toad-headed agama, *Phrynocephalus arabicus*, UAE.

**Новый вид *Oochoristica* (Cestoda, Linstowiidae) у арабской круглоголовки, *Phrynocephalus arabicus* (Sauria, Agamidae), из Объединённых Арабских Эмиратов.** Шустер Р. К. — Шесть полных стробил *Oochoristica phrynocephali* Schuster, sp. n. были обнаружены в кишечнике 4 из 13 исследованных арабских круглоголовок *Phrynocephalus arabicus* из эмирата Дубаи, Объединённые Арабские Эмираты. *O. phrynocephali* относится к группе видов *Oochoristica* с круглыми присосками и числом семенников меньше 25 в каждом кластере. Вид отличается от *O. sobolevi*, *O. elongata*, *O. parvogenitalis*, *O. feluii*, *O. jonnesi*, *O. macallisteri*, *O. lygosomatis*, *O. junkea* и *O. novaezealandae* меньшим сколексом и меньшим диаметром присосок.

**Ключевые слова:** *Oochoristica phrynocephali*, Cestoda, Linstowiidae, арабская круглоголовка, *Phrynocephalus arabicus*, ОАЭ.

### Introduction

The genus *Oochoristica* was established by Lühe (1898) for unarmed cestodes with irregularly alternating genital openings and a uterus that transmutes quickly in a way that eggs can be found embedded in the parenchyma of gravid segments. *Oochoristica tuberculata* (Rudolphi, 1819) was chosen as type species. A list of *Oochoristica* species from reptiles contained 88 representatives (Burse et al. 2010) and four more species have been added recently (Mašova et al., 2010; Schuster, 2011; Bursey, Goldberg, 2011; Mašova et al., 2012).

Altogether 17 *Oochoristica* species have been found in agamids so far and the newly described *O. phrynocephali* is the first cestode found in lizards of the genus *Phrynocephalus*. This specious genus consists of more than 40 species occurring in Arabia, Central and East Asia.

*P. arabicus* (Anderson, 1894) inhabits sandy desert biotopes in the UAE, Oman, Yemen, Saudi Arabia, Qatar and Kuwait, with extreme hot temperatures during the summer months. It is found also in bordering territories of the southern Palaearctic, like Jordan and Iran (Mousa Disi et al., 2009; Sorae et al., 2010; Al Sirhan et Brown, 2010). The Arabian toad-headed agama is a small inconspicuous lizard of up to 110 mm total body length and a body weight of up to 3–5 g. It has never been an object for helminthological studies before.

### Material and methods

In June 2011, 13 *Phrynocephalus arabicus* were caught by hand in the desert of the Dubai Emirate, south east of Dubai city (24°51'41.35"N; 55°24'01.36"E) and euthanised with ethyl ether. The necropsy was performed under a stereoscopic microscope. The body was opened with scissors starting from anal opening till the lower jaw. The internal organs were removed, placed into normal saline and examined separately. Only

3 agamas were infected with intestinal cestodes of the genus *Oochoristica* with a burden of 1, 3 and 4, respectively. All 8 tapeworms were washed and kept in tap water at room temperature until their complete relaxation, fixed in hot 10% formalin and stained with lactic carmine. They were dehydrated in rising concentrations of alcohol, cleared in xylene and mounted in DPX. Measurements and numeric data were given as means followed by range I brackets. Drawings were made from photographs taken with a digital camera (Olympus DP 71) connected to a microscope (Olympus BX61).

***Oochoristica phrynocephali* Schuster, sp. n.**

Type material: Holotype (Cat. No 7507) and 3 paratypes (Cat. No 7508) deposited in the Museum für Naturkunde, Berlin, Germany.

*Oochoristica phrynocephali* with characters of *Oochoristica* Lühe, 1898. Strobila ( $n = 8$ ) acraspedot, bilaterally flatted, 30 (25–36) mm long and up to 750  $\mu\text{m}$  wide, consisting of 45 (41–50) segments; Unarmed scolex 154 (120–180)  $\mu\text{m}$  wide with four circular suckers 45 (40–55)  $\mu\text{m}$  in diameter; Unsegmented neck 575 (400–800)  $\mu\text{m}$  long and 180 (150–210)  $\mu\text{m}$  wide. First immature segments wider than long, becoming square at a later stage. Testes start to occur between segment 13 and 17; starting from segment 21–23, there are only 3–4 fully developed mature proglottids, square or longer than wide: 424 (350–440)  $\times$  331 (250–420)  $\mu\text{m}$ . Gravid proglottids elongated, 1513 (1100–1800)  $\mu\text{m}$  long and 668 (320–740)  $\mu\text{m}$  wide. Osmoregulatory system consisting of 4 longitudinal canals. An anastomosis in posterior region of segments described for other *Oochoristica* species not seen. Genital pores irregularly alternating situated in the anterior half at 37 % and 27 % of total length (from anterior end) in mature and gravid segments, respectively. Genital atrium muscular, up to 25  $\mu\text{m}$  deep. Testes in one cluster in numbers between 16 and 22 behind female reproductive glands with some testes situated around posterior half of vitellarium. Testes in mature segments 18 and 20  $\mu\text{m}$  in diameter. Testes stay visible in postmature segments but vanish in gravid proglottids. Cirrus sac thin walled, cigar shaped 85 (70–90)  $\mu\text{m}$  long and 29 (20–30)  $\mu\text{m}$  wide, extending between longitudinal excretory vessels and its basis just reaching level of poral ovary lobe. Vas deferens coiled, directed posteriormedian, vanishing when crossing center of ovary ventrally. Ovary bilobed, situated in center of segment, 100–120  $\mu\text{m}$  wide. Aporal lobe slightly larger, subdivided into 4–5 lobuli while poral lobe consisting of 3–4 lobuli. Vitellarium postovarian, spherical in shape, 30–45  $\mu\text{m}$  in diameter. Ootype and Mehlis' gland complex between ovary and vitellarium. Vagina crossing basis of poral ovarian lobe, opening into genital atrium posterior to cirrus sac. After reaching its full development in hermaphrodite segments (23–26) ovary and vitellarium disintegrate quickly in the following segments being replaced by developing eggs. Terminal segments contained 149 (140–170) egg capsules, 60–75  $\mu\text{m}$  in diameter, embedded in 3 layers in the parenchyma. Eggs measuring 40–45  $\mu\text{m}$  in diameter containing oncospheres (30  $\mu\text{m}$ ) with 6 embryonal hooks, 18–20  $\mu\text{m}$  long.

Type host: Arabian toad-headed agama *Phrynocephalus arabicus* (Anderson, 1894) (Reptilia, Agamidae).

Site of infection: small intestine.

Type locality: Dubai, United Arab Emirates (24°51'41.35"N; 55°24'01.36"E).

Prevalence: 3/13.

Intensity: 1, 3, 4.

Etymology: The specific epithet is derived from the generic name of the host, *Phrynocephalus*.

**Differential diagnosis**

*O. phrynocephali* can be distinguished from the other 8 species in which testes are less than 25 and grouped in one cluster by a smaller size of scolex and diameter of suckers. Out of the mentioned species, *O. parvogenitalis* (Dupouy et Kechemir, 1973),

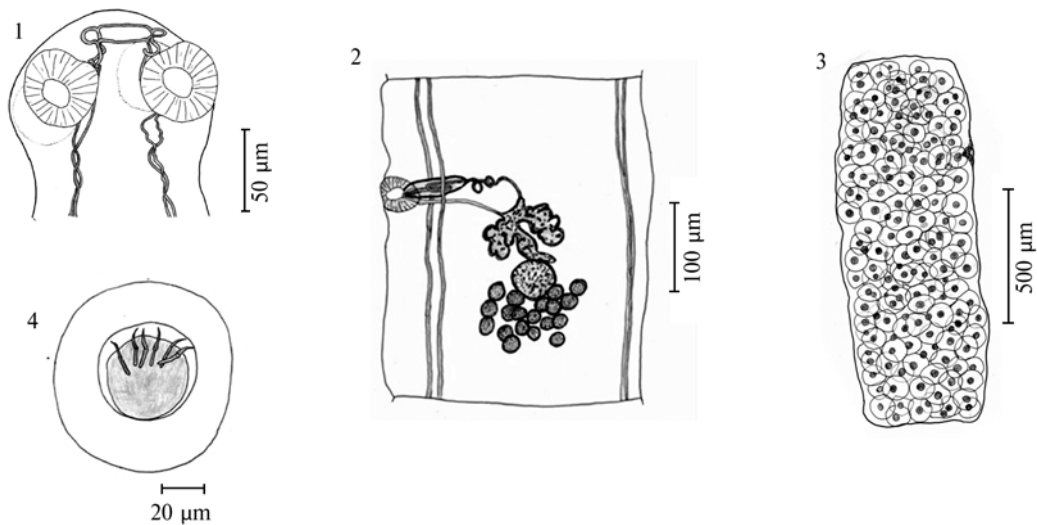


Fig. 1–4. *Oochoristica phrynocephali*: 1 — scolex; 2 — mature proglottid; 3 — gravid proglottid; 4 — egg capsule.

Рис. 1–4. *Oochoristica phrynocephali*: 1 — сколекс; 2 — зрелая проглоттида; 3 — беременная проглоттида; 4 — яйцевая капсула.

*O. novaezealandae* (Schmidt et Allison, 1985) have less than 15 testes. In addition *O. elongata* (Dupouy et Kechemir, 1973), *O. parvogenitalis* (Dupouy et Kechemir, 1973), *O. feliui* (Foronda et al., 2009), *O. lygosomatis* (Skinker, 1935), *O. junkea* (Johri, 1950) and *O. novaezealandae* can be distinguished by the size of their strobila while *O. jonnesi* (Burse, McAllister et Freed, 1997) and *O. macallisteri* (Burse et Golberg, 1992) that have a comparable strobila length but possess 2–3 times more segments in their strobila. The number of lobuli (3–5) in the ovary lobes is a further parameter to differentiate *O. phrynocephali* from *O. lygosomatis* and *O. feliui* that have more lobuli or from *O. junkea*, *O. elongata* and *O. novaezealandae* with undivided lobes.

### Remarks

The occurrence of *Oochoristica* species in the Arabian Peninsula is poorly investigated. So far only 5 species have been found in Saudi Arabia, Iraq and the UAE. These are *O. najdej* (Magzoub, Kasim, Shawa, 1980) in *Uromastix aegypticus* (Magzoub et al., 1980), *O. nupta* (Kugi et Mahammed, 1988) in *Agama nupta* (De Filippi, 1843), *O. tuberculata*<sup>1</sup> in *U. aegyptica* (Forsskål, 1775) and *U. microlepis* (Kugi, Mohammed, 1988) and *O. chalcidesi* (Schuster, 2011) in *Chalcides ocellatus* (Forsskål, 1775) (Schuster, 2011).

In neighboring Egypt, *O. truncata* (Meggitt, 1927) was found in snakes and agamas (Meggitt, 1927) while *O. tuberculata* was detected in skink species, *Eumeces schneideri* (Daudin, 1852), *Scincus scincus* (Linnaeus, 1758) and *Chalcides ocellatus* (Baer, 1927; Grotschaft, Moravec, 1983). A further species, *O. khalili* (Hamid, 1932) was described in *Psammophis schokari* (Hamid, 1932). None of the mentioned species fit into the morphology of *O. phrynocephali*.

With a length ranging between 25 and 36 mm *O. phrynocephali* is a medium sized *Oochoristica* species. It has a small scolex and minute circular suckers. However, care should be taken when comparing metrical data of different species since different ways of fixing can result into artificial variation of metrical data within one species (Criscione, Fond, 2001). For this reason numerical features should be given priority.

<sup>1</sup> Described here under the synonym *O. agama*.

The number and arrangement of testes are the key features to differentiate between *Oochoristica* species apart from number of segments, strobila size, presence or absence of a neck, diameter of scolex and suckers, length of cirrus sac, number of lobules of ovary lobes and shape of the vitellarium (Burse et al., 2010). The number of testes in *O. phrynocephali* arranged in one cluster varied between 16 and 22. Only 8 other species have less than 25 testes arranged in 1 cluster and circular suckers. These are *O. elongata* from *Agama multabilis* (Merrem, 1820) and *O. parvogenitalis* from *Stenodactylus petriei* (Anderson, 1896) from Algeria, *O. feliui* from *Gallotia atlantica* (Peters et Doria, 1882) from the Canary Islands, *O. jonnesi* from *Hemidactylus mabouia* (Moreau De Jonnès, 1818) from Cameroon, *O. macallisteri* from *Uta stansburiana* (Baird et Girard, 1852) from California, *O. lygosomatis* from *Lygosoma chalcides* (De Rooij, 1915) from Java, *O. junkea* from *Gecko gecko* (Linnaeus, 1758) from India and *O. novaezealandae* from *Leiolopisma nigriplantare* (Peters, 1874) from New Zealand. Of these, *O. novaezealandae* and *O. parvogenitalis* have only 15 or less testes. All mentioned above species have a scolex wider than 200 µm and suckers of a diameter of more than 80 µm compared to measurements of scolex width and sucker diameters of *O. phrynocephali*: 120–180 and 40–55, respectively. While *O. macallisteri* and *O. jonnesoni* have strobila lengths comparable to those of *O. phrynocephali* the number of segments in their strobilae is 95–122 and 150–175, respectively. Thus, they exceed this parameter compared to *O. phrynocephali* by more than 2–3 times. This reflexes on the shape of mature and gravid proglottids that are wider than long in these species while longer than wide in *O. phrynocephali*. Strobilae of the remaining species are considerably shorter (*O. lygosomatis*, *O. feliui*) or longer (*O. junkea*). The lobes of the ovary of *O. phrynocephali*, *O. macallisteri* and *O. jonnesoni* are subdivided into 3–5 lobuli while the other species (*O. lygosomatis*, and *O. feliui*) have 5–7 or more lobuli in each lobe or undivided lobes (*O. junkea*, *O. elongata*, *O. novaezealandae*).

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