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SHAPE DEVIATIONS IN EGGS OF *ASCARIS LUMBRICOIDES*

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Abstract. Some types of shape deviations, observed in eggs of *Ascaris lumbricoides* Linné, 1758 are described. In some instances these deviations are so considerable that solitary findings in the examined material (during helminthological investigations of the soil) may lead to an inaccurate determination of the finding. Only such shape abberations affecting also internal egg envelopes (membrana lucida and membrana vitellina), were considered.

The eggs of *Ascaris lumbricoides* Linné, 1758 are most varying in size and, therefore, such a wide range of different values is found in the literature. The length of the eggs with all its envelopes varies from 52–84 μ, its width from 45 to 67 μ (LÝSEK 1959, 1961). This variability is not so prominent in the general look and shape of the eggs. A normal, fertilized egg has three clearly differentiated egg envelopes. The internal albuminous envelope gives the egg its typical look. Its uneven thickness is responsible for the ruggedness of its surface. However, this albuminous envelope is shed very easily, the egg looses its typical look and the surface becomes smooth, without protuberances (Fig. 1).

Mostly, the shape of the eggs is moderately oval and the difference between length and width is rather small. The ratio of length to width can be expressed mathematically by computing the width-length index I after the formula I % = width by 100 length.

The values of this index express the overall shape of the egg. They range – for a large complex of eggs – from 60–100 %. The small numbers characterize oval eggs, the length of which surmounts their width, the higher values I % characterize eggs with less differences between length and width and finally I 100 % refer to completely spherical eggs. The average index width: length ranges from 79–82 % (LÝSEK 1959).

The typical egg, when without its internal albuminous envelope, is regularly elliptic, one of the axis slightly prolonged (Fig. 1). There are also spherical eggs with a width: length index I % = 100. In this short communication, some shape deviations of mature eggs of the common roundworm (*A. lumbricoides*) from fattened pigs are described.

MATERIAL AND METHOD

Shape deviations were observed in eggs obtained from the uteri of sexually mature female roundworms from fattened pigs. These eggs were examined on native, unfixed preparations in water.

RESULTS

1. The most frequent deviation from the typical, regular oval shape is a slight shifting of the axis of the egg in lateral direction. One of the side walls of the eggs is more convex, while the other is flatter (Fig. 2). Both dimensions of the egg (length and width) remain mostly within the range of values the same as the index length: width, which was also found to remain within the range of earlier established values. The eggs develop normally.
2. Another frequent deviation is an increase in length, while the width still remains within the limits of the border values (Figs. 3—6). These eggs, without their internal albuminous membrane, resemble in shape the eggs of some animal nematodes, e.g. Nematodirus or some Strongylata. As long as the longer axis becomes not too elongated, the larvae in these eggs develop normally. In one of our findings, the egg resembled an enormously elongated regular oval with a width: length index of I % = 56, containing a larva. In very elongated eggs with an even smaller width: length index, the larvae either do not develop or various accidental developmental deviations are occurring (Figs. 4 and 5).

Frequently, we found eggs with the prolonged longer axis shifted laterally, causing the eggs to appear like lentils with one flat and one convex side. Their I % was usually high enough to allow for the development of the larvae (Fig. 6).
3. Another frequent deviation from the normal was observed in cone-shaped eggs with a rounded peak and base, which appear like regular drops under the microscope. The width: length index of these eggs is relatively high enough for the normal development of the larvae (Fig. 7).
4. Interesting in shape are eggs with various processes on their envelope. These eggs usually retain their basic proportions. The adnexae are not only formed by the irregularities of the outer egg envelopes, but even the egg cavity with the intact larvae communicates with them. This adnexal cavity, if large enough, is used by the normally developing larvae in these eggs for larval movement.

The adnexae are localized at various sites on the egg envelopes, mostly at one of the egg poles, thus prolonging the longer axis of the egg (Figs. 8—10). These adnexae are bud-shaped.

Laterally situated adnexae (Fig. 11) are generally wide and have no influence on the development of the larvae.
5. Very rare is the finding of cylindrical eggs. Under the microscope, the profile of the egg resembles a rectangle with rounded corners, the shorter arms slightly pressed inside (Fig. 12). The egg contained a motile larva.

The described shape deviations indicate not only the large variability in sizes but also in shape of the ascaris eggs. There are many transient stages among these deviations. It is interesting that most of these shape deviations have no substantial influence on the development of the larvae. Only devitations which are becoming too prominent, e.g. enormously long and narrow eggs, often cause aberrances to the developing embryo and an anomalous larva is formed in the egg.

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EXPLANATIONS TO THE PLATES

Plate I

Fig. 1. Typical egg of *Ascaris lumbricoides*, regularly elliptic, without outer albuminous envelope.

Fig. 2. The most frequent shape deviations of ascaris eggs. Longer axis of egg shifted laterally, making one lateral wall convex, the other flatter. Overall measurement still within the limits of natural variability.

Fig. 3. Regularly oval egg with very elongated longer axis. I % = 56, which is still sufficient for the normal development of the larva inside the egg.

Fig. 4. Very elongated egg I % = 49. This value is too low for normal development, the larva develops abarrantly.

Fig. 5. Greatly elongated egg, length 102 μ, width 46 μ. Length surpassing normal variability of eggs. I % = 45. This value too low for normal development. Aberrant larvae develop in these eggs.

Fig. 6. Very elongated egg, length 97 μ, width 50 μ. Longer axis shifted laterally, egg resembles a lentil with one side flat, the other convex. I % = 51. Big enough for a normal development of larvae.

Plate II.

Fig. 7. Drop-shaped egg with rounded peak and basis.

Fig. 8. Egg with small subapically situated wide protrusion.

Fig. 9. Moderately elongated egg with bud-like apically situated protrusion. Adnex cavity communicating with egg cavity through narrow passage.

Fig. 10. Ascaris egg with massive apical protrusion, resembling a table-tennis racket. The adnex cavity visibly forming part of the egg cavity. Liberated eggs use this adnex cavity for their movements.

Fig. 11. Egg with laterally situated protrusion of widely conical shape.

Fig. 12. Solitary finding of egg of rare shape. The egg forms a cylinder – on the picture it is rectangular – with basis moderately invaginated towards the egg cavity. Egg with motile larva.