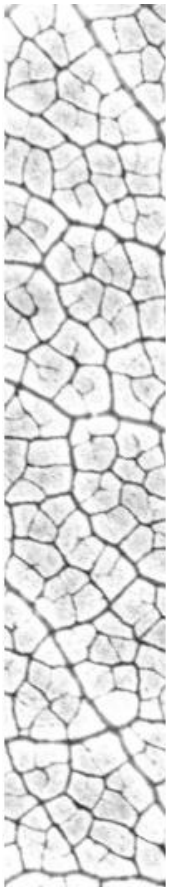

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Influence of constricts on the body of a medical leech on their reproductive ability

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Abstract
In the experiment, 120 medical leeches of three species were used: H. verbana, H. medicinalis, H. orientalis. In which constrictions (defect) on their body and reproductive belts were revealed. Those leeches, which had constricts, right up to the rupture of its tissues in these places, were planted two or three in liter jars for reproduction. Their readiness for reproduction was checked by fecundity belts. Piece conditions were created by examples of their living in the wild. We found that this defect (constrictions) contribute to their poor laying of cocoons, up to their absence. Also, most leeches died without laying cocoons in the second week of jigging. The resulting cocoons were defective. our results prove that the appearance of constrictions in a medical leech significantly affects their reproductive. These constrictions appear in about 5% of leeches fed by human and animal blood.

Keywords: medical leeches, reproductive, ectoparasite, constrictions, hematophagus, cocoons

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INTRODUCTION

Nowadays, the ecological situation on the whole planet has worsened. Therefore, if earlier it was possible to meet a medical leech in many reservoirs, now they are less and less common in the wild (Collier et al. 2016). And the urgent task of the whole world is to protect medical leeches from extinction (.So, as this living creature is not only an ecological bio-indicator, but also a biological micro-factory of a number of biologically active substances with therapeutic properties (Abdisa 2018, Aminov and Frolov 2017, 2018, Grafskaia et al. 2019, Hosseinirad et al. 2017). Therefore, now many researchers are looking for ways to protect them from extinction (Chernaya et al. 2019), which makes this study very relevant. In our past works and the works of other authors, the presence of cannibalism was revealed in medical leeches (Aminov 2019a, Kutschera and Roth 2005, 2010, Mustafa and İsmail 2012). It manifests itself most if fed and hungry leeches are placed in the same habitat. Cannibalism itself may be one of the reasons for their extinction in the wild. Many researchers and biofactories are looking for different ways to increase their productivity by changing their content, habitat (Aminjan and Hossein 2019, Ceylan et al. 2015, 2017, Elliott 2008, Manava 2019, Mustafa et al. 2019, Zhang 2008). But how the defect of the constrictors themselves on their body affects the productivity is studied for the first time. The appearance of constrictions in medical leeches may indicate an immunological conflict between human blood eaten and the tissue microenvironment of the leech, and researchers also noted during histological examination that there are destructive pathological processes in the area of these constrictions (Litvinenko and Frolov 2014). Researchers believe that only about half of the leeches that previously had constrictions on the body die, while the other part is likely to cope with the immunological aggression of blood consumed, due to its decrease in the body during regurgitation (Milevska and Fedotov 2015). Therefore, it began to happen how this defect will affect their reproduction.

MATERIALS AND METHODS

In the experiment, 120 medical leeches of three types were used: H. verbana, H. medicinalis, H. orientalis. The studies were carried out on the basis of the educational and research laboratory of cell and body biotechnology of Zaporizhzhya National University (TU U 05.0-02125243-002: 2009 “Medical Leech”, sanitary and epidemiological conclusion of the Ministry of Health of Ukraine No. 05.03.02-06 / 49982, dated 12.08.2009). After feeding, leeches of uterine age were planted for copulation of 8 pieces in a three-liter capacity with water at an ambient temperature of + 23-25 ° C. After the appearance of fertility belts at leeches, were planted in the ground with peat for a month. Comparison was made with the control group of leeches without constrictions. Constrictions at leeches hit different intensity of damage, up to rupture of its tissues in these places. Their

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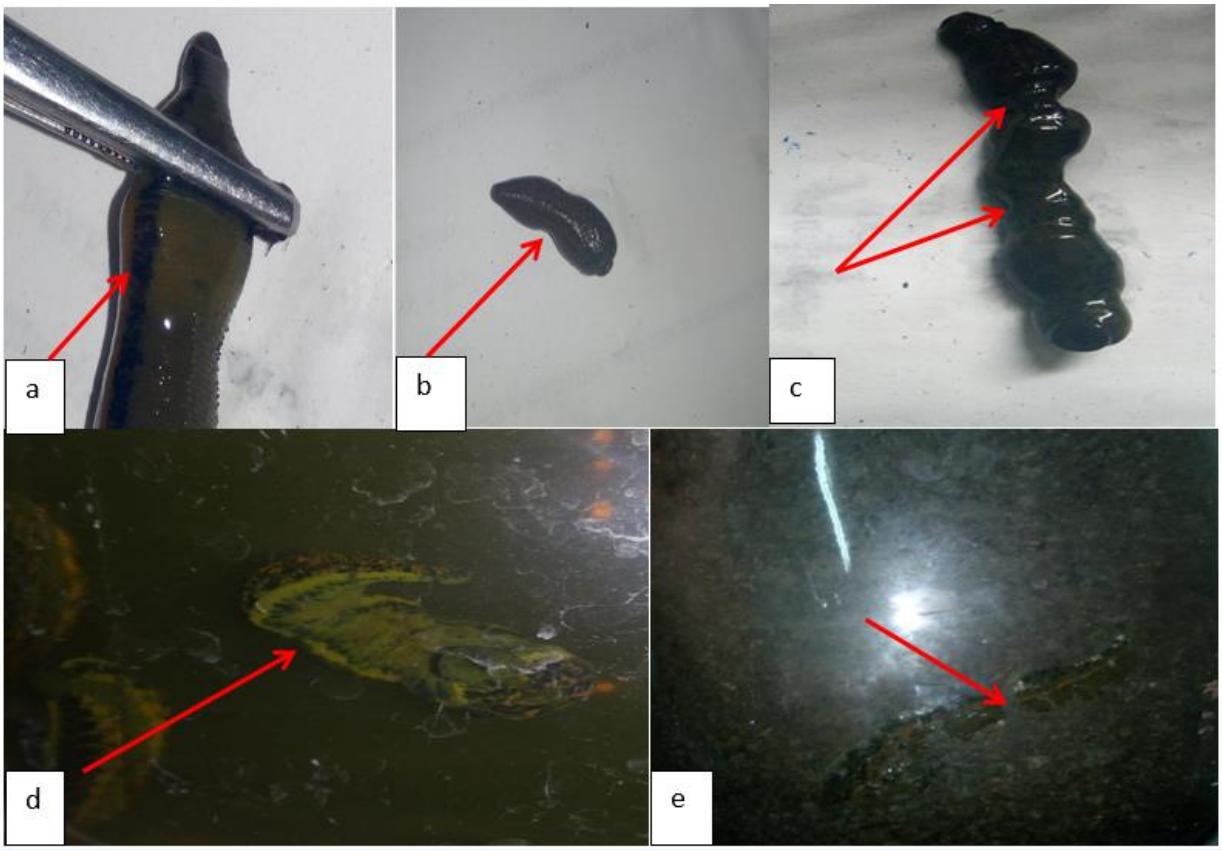

Fig. 1. Fecundity belts - a , by constrictions of different intensities - b,c,d,e

Table 1. The average amount of cocoons, X±Se

Species	Amount of cocoons, n=120	
	Control	Experience (with constrictions)
H. verbana	4.8±0.5	0.45±0.07*
H. medicinalis	3.7±0.4	0.41±0.04*
H. orientalis	2.6±0.4	0.3±0.05*

Note: * - p <0,05 in comparison with the control group

readiness for reproduction was proved by the appearance of fertility belts, which indicate the accumulation of sperm in their body and their readiness for reproduction. Piece conditions were created by examples of their living in the wild. Statistical processing of the results was carried out using parametric statistical methods using the software package Microsoft XP "Exel" and IBM SPSS Statistics 21.0 (USA). In case of compliance with the normal distribution law, the signs in the studied samples were studied by the parametric method (Student's t-criterion), and the values in the tables are presented as X ± SE, where X is the vibrational mean, SE is the standard error of the mean. Differences were considered significant at a significance level of p <0.05.

RESULTS AND DISCUSSION

In leeches with fecundity belts (**Fig. 1a**) and by constrictions of different intensities (**Fig. 1b**-**d**), we found that this defect (constrictions) contributed to a very poor laying of cocoons with leeches, up to their absence (**Fig. 1e**, **Table 1**) in three types were used: H. verbana, H. medicinalis, H. orientalis.

Also, most leeches died without laying cocoons in the first week of (**Fig. 2f**-**h**) in three types were used: H. verbana, H. medicinalis, H. orientalis.

At first they released large amounts of eaten blood into the ground, and then died (**Fig. 2f**-**h**).

The resulting cocoons were defective without babies. Our results prove that the appearance of constrictions in a medical leech significantly affects not only their condition but also their reproductive ability (**Table 1**).

As described above, the researchers noticed during the histological examination that destructive pathological processes exist in the area of these constrictions, and our studies prove that their reproductive function also suffers (Litvinenko and Frolov 2014). The burping of blood in the ground during laying of cocoons in our studies is similar to the version of other researchers who believe that only half of the leeches that have previously been narrowed die, while the other half may cope with the immunological aggression of the blood eaten due to

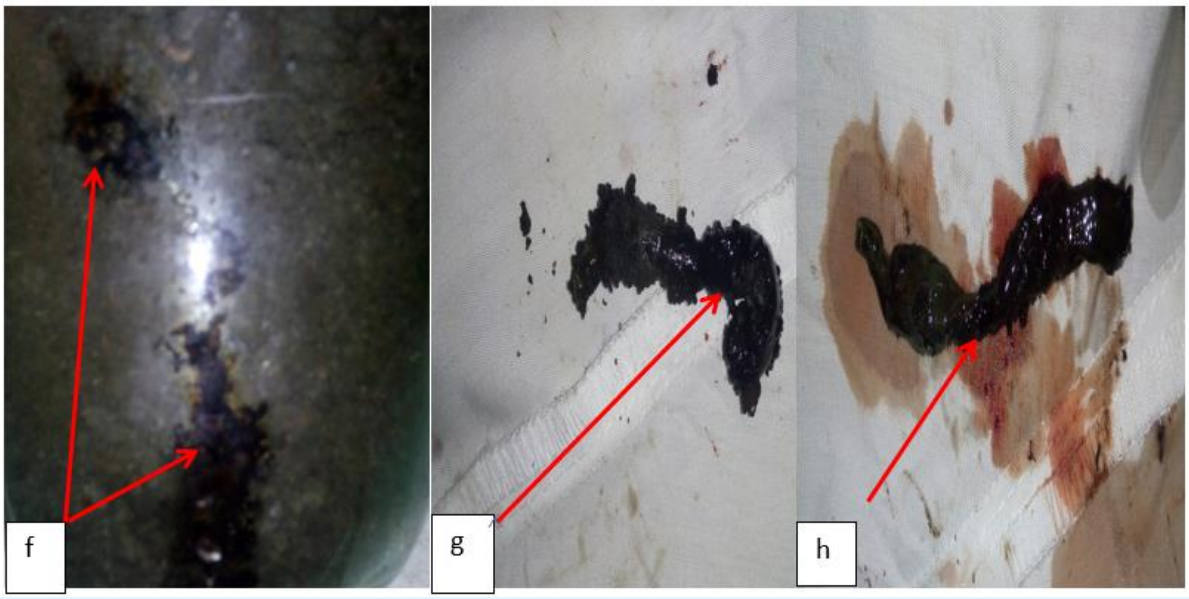

Fig. 2. Death of medical leeches with constrictions: e, f, g

its regurgitation (Milevska and Fedotov 2015). And this is confirmed by our observation that these constrictions could both appear and disappear after some time at some leeches. We also believe that this is also possible due to the regenerative ability of substances in her body, which could contribute to the healing of the tissues of leeches themselves after the defect. These constrictions appear in about 4-5% of leeches fed by human and animal blood. Therefore, our research results obtained can be used to improve their breeding in the habitat. Knowing that medical leeches nowadays appear less and less in the wild, and their biologically active substances have many therapeutic effects. This factor can contribute to an increase in their production in biological factories.

CONCLUSIONS

Our research results show that constrictions negatively affect not only their tissues in the area of the defect, but also negatively affect their reproductive ability. On average, 4–5% of leeches have this defect. Most medical leeches die even without postponing more than one cocoon. The resulting cocoons in leeches are defective without offspring. The appearance, and then the disappearance of constrictions is possible, is also associated with regenerative substances in her body, which could contribute to the healing of tissues of the leeches themselves of the disappearance of this defect.

REFERENCES

Abdisa T (2018) Therapeutic importance of leech and impact of leech in domestic animals. MOJ Drug Des Develop Ther. 2(6):235–242. https://doi.org/10.15406/mojddt.2018.02.00068

Aminov R (2019a) Cannibalism of the medical leeches Hirudo verbana. Eurasia J Biosci. 13(1): 23-26.

Aminov R (2019b) Survival of medical leeches after partial cannibalism. Eurasia J Biosci 13: 909-912.

Aminov RF, Frolov AK (2017) Influence of ectoparasite - Hirudo verbana on morphogenetic reactions of the host organism – rattus. Current trends in immunology, 18: 107-117.

Aminov RF, Frolov AK (2018) The impact of fetal load of Hirudo verbana saline extract antigens morphometrical, hematological and immunological parameters of rats in the early stages of post-embryonic development. Annals of parasitology, 64(1): 13-20.

Ceylan M, Çetinkaya O, Küçükkara, R, Akçimen, U (2015) Reproduction efficiency of the medicinal leech Hirudo verbana Carena, 1820. Turk. J. Fish. Aquat. Sc., 15: 411-418. https://doi.org/10.4194/1303-2712-v15_2_27

Ceylan M, Küçükkara R, Akçimen U, Yener O (2017) Reproduction efficiency of the Horse Leech, Haemopis sanguisuga (Linnaeus, 1758). Invertebr Repro Dev., 61: 182–188. https://doi.org/10.1080/07924259.2017.1318096

Chernayaт LV, Kovalchuk LA, Mikshevich NV (2019) Geographical variability of heavy metal concentrations in tissues of medical leeches (Hirudo medicinalis, Hirudo verbana) and in bottom deposit. Nature Conservation Research, 4(3): 67-77. https://doi.org/10.24189/ncr.2019.051

Collier KJ, Probert PK, Jeffries M (2016) Conservation of aquatic invertebrates: concerns, challenges and conundrums. Aquat. Conserv. 26, 817-837. https://doi.org/10.1002/aqc.2710

Elliott JM (2008) Population size, weight distribution and food in a persistent population of the rare medicinal leech, Hirudo medicinalis. Freshw. Biol., 53, 1502–1512. https://doi.org/10.1111/j.1365-2427.2008.01978.x

Frolov AK, Litvinenko RA (2014) Cellular and tissue reactions of HIrudo verbana (Carena, 1820) in the posttrophic processes. Bulletin of Zaporizhzhya National University, 2: 176-189.

Grafskaia EN (2019) Medicinal leech antimicrobial peptides lacking toxicity represent a promising alternative strategy to combat antibiotic-resistant pathogens. European Journal of Medicinal Chemistry, 180: 143e153.

Hosseinirad SA, Yaghoubi G, Haidari B (2017) Misdiagnosis of ocular leech infestation. Journal of surgery and trauma, 5(1-2): 36-38

Kutschera U, Roth M (2005) Cannibalism in a population of the medicinal leech (Hirudo medicinalis L.). Biology Bulletin, 32: 626-628.

Kutschera U, Roth M, Ewert JP (2010) Feeding on Bufoid Toads and Occurrence of Hyperparasitism in a Population of the Medicinal Leech (Hirudo verbana Carena 1820). Research Journal of Fisheries and Hydrobiology, 5(1): 9-13.

Maleka M, Jafarifara F, Aminjanb AR, Salehia H, Parsaa H (2019) Culture of a new medicinal leech: growth, survival and reproduction of Hirudo orientalis Utevsky and Trontelj, 2005 under laboratory conditions. Journal of natural history. 53, 11-12: 627-637. https://doi.org/10.1080/00222933.2019.1597200

Manava M, Ceylanb M, Büyükçapar HM (2019) Investigation of reproductive efficiency, growth performance and survival of the southern medicinal leech, Hirudo verbana Carena, 1820 fed with mammalian and poultry blood. Animal Reproduction Science, 206: 27-37. https://doi.org/10.1016 / j.anireprosci.2019.05.004

Mustafa C, İsmail E (2014) A study on nutrition of medicinal leech (Hirudo verbana Carena, 1820): Cannibalism? Ege J Fish Aqua Sci., 29(4): 167-170. https://doi.org/10.12714/egejfas.2012.29.4.03

Mustafa C, Ramazan K, Ufuk A (2019) Effects of broodstock density on reproduction efficiency and survival of southern medicinal leech, Hirudo verbana Carena, 1820. Aquaculture, 498: 279-284. https://doi.org/10.1016/j.aquaculture.2018.08.016

Mylevskaya EG, Fedotov ER (2015) Morphological status of the medicinal leech after blood feeding. Topical issues of biology, ecology and chemistry, 10(2): 63-71.

Zhang B, Lin Q, Lin J, Chu X, Lu J (2008) Effects of broodstock density and diet on reproduction and juvenile culture of the leech, Hirudinaria manillensis Lesson, 1842. Aquaculture, 276: 198-204. https://doi.org/10.1016/j.aquaculture.2008.02.00